THE MONTHLY REVIEW

PUBLISHED MONTHLY BY

American Electroplaters' Society

545 FIFTH AVENUE, NEW YORK, N. Y.

August 1943 • Vol. XXX, No. 8

Subscription $3.00 a Year

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NATIONAL HEADQUARTERS

545 Fifth Ave., New York, N. Y. • Phone MUrray Hill 2-4631

JACK BAIN, *Publisher*

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E. T. CANDEE, *Executive Secretary and Acting Editor*

Box 791, Waterbury, Conn.

Entered as second class matter January 21, 1943, at the post office at New York, N. Y., under the Act of August 24, 1912.

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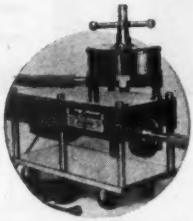
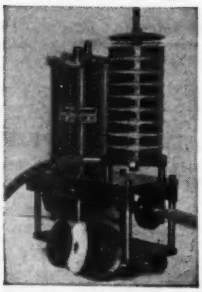
Hy-Speed



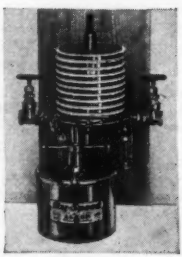
FILTER EQUIPMENT for PLATING SOLUTIONS



The above heading is the title of our book on filter equipment for the plating department.

It describes the type of filters we make, how the unusual principle of filtration works, and the results you will get by completely filtering your plating solutions of all dirt, sludge, and impurities that are present in most solutions.

At the right are two portable units and two arranged for pipe line connection. Lower left shows you the small, compact easy to operate portable unit keeping a tank solution clean.



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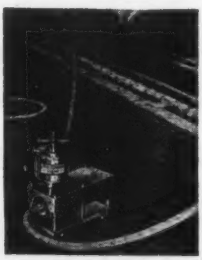
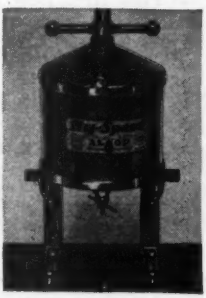


If you haven't looked over our filter book, do so at our expense. A post card will bring it.



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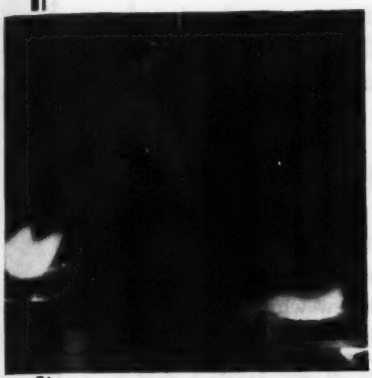
THE MONTHLY REVIEW



THE COVER

Melting brass for Anodes in Gas Crucible Furnace. Illustration furnished through the courtesy of Hanson-Van Winkle-Munning Company.

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Your Review

By E. T. CANDEE
Executive Secretary

FOR the past year the officers of the Society have concentrated on improving the Review as fast as feasible. They have succeeded in improving the mechanical features of the Review, changed the type faces, buyer's guide, and other details. They have also tried hard to obtain the type of article for the Review which would be of the most interest to the members. We have had some comments on the articles published in the Review and would appreciate further comments or suggestions on the material to be published.

Many branches have speakers who only travel locally but who discuss subjects of interest to the whole Society. The branches should send in the information for publication in the Review. There are also many members who have done development or research work, or devised new production methods which can be published. They seem reluctant, however, to write it up in the form of a paper. These men should be encouraged to write up material and submit it to the editor of the Monthly Review for publication.

We would like to point out there is a prize for the best paper published in the Review throughout the year, and that certain papers will be paid for where an unusual amount of effort is required to prepare them. We suggest all the members keep this in mind so we may get the best information available on metal finishing for the Monthly Review.

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"Synthetic Cation and Anion Exchange Resins as New Research Tools in the Field of Electro Deposition and Related Art"

By W. S. MORRISON
Illinois Water Treatment Co., Rockford, Illinois

THE research of Adams & Holmes in 1935, developing formaldehyde resins, culminated many years of study in the field of base exchange chemistry. From the time of Way, an early discoverer of the base exchange principle of certain soil clays, to Gans in Germany, almost a generation passed before the possibilities of zeolite reactions were recognized. Gans in Germany made first use of the principle of zeolite exchange by the fusion of various silicates and aluminum salts. The resultant sodium zeolite process is well known and applications for it have been found in many industries. During the First World War the green sand beds in the East were developed as a natural source of the material and were accepted by industry as they were faster in the regeneration cycle than the fused zeolites although they were lower in exchange capacity per cubic foot.

Since 1918 a great deal of work has been conducted on synthetic zeolite which is prepared by drying alumino silicate gels. The resultant silica gel zeolites have been quite popular during the past fifteen years.

$$1.)\quad \begin{matrix} CaCl_2 \\ CaCO_3 \\ MgSO_4 \\ \text{etc.} \end{matrix} + \text{Na Zeolite} \longrightarrow \begin{matrix} Ca \\ Mg \end{matrix} \text{ Zeolite } + \begin{matrix} NaCl \\ Na_2CO_3 \\ Na_2SO_4 \end{matrix}$$

$$2.)\quad \begin{matrix} Ca \\ Mg \end{matrix} \text{ Zeolite} + NaCl \longrightarrow \text{Na Zeolite} + \begin{matrix} Ca \\ MgCl_2 \end{matrix}$$

Heretofore, then, a discussion of exchangers has been limited to mineral exchangers of natural or synthetic origin, such as the above-mentioned hydrated aluminum silicates. These zeolites can be labeled only as neutral exchangers because in the presence of acids they completely break down and are destroyed rapidly. However, the natural greensand

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exhibits more strength to acid than the synthetic product and it is possible to exchange some metallic ions for the hydrogen ion of the acid before the greensand deteriorates. A realization of this fact was apparently the inspiration that influenced the early research in decomposing carbonates by means of hydrogen exchangers.

The first hydrogen exchangers were of a humus character. These were followed by natural organic materials such as those derived from the sulfonation of coal, lignite or peat. These materials, chemically speaking, were of complex ill-defined character; so the "tailor-made" resins produced by the Resinous Products & Chemical Company and introduced to the field by the Illinois Water Treatment Co., were the first material to be offered having very definite physical and chemical properties.

The Resinous Products & Chemical Company became the sole American licensees under the basic patents of Adams & Holmes in 1939. The next two years were spent in perfecting the resins and then in 1941 the Illinois Water Treatment Co. successfully worked out design of equipment for the commercial application of the then newly named Amberlite resins. During the period of resinous research the Illinois Water Treatment Co. experimented with various carbonaceous materials of a hydrogen exchange nature and successfully applied a design for the boiler water treatment field during this period.

The resins finally accepted for the water purification field were called Amberlite IR-1 and Amberlite IR-4. The Amberlite IR-1 is essentially a cation exchange resin as its most widely used function is to replace all cations for hydrogen. However, when regenerated on the sodium cycle it will replace hardness producing ions. It should be stressed here that the IR-1 is an excellent medium for the removal of simple-hardness producing elements as it has high exchange values per cubic foot and can be subjected to much higher flow rates per square foot than was ever accomplished in either synthetic or natural sodium zeolites. The material is completely unaffected in exchange value by iron or other bothersome metals and remains stable when subjected to low silica waters.

The Amberlite IR-4 is an anion exchange adsorbent which when coupled with the effluent from an exchange column of IR-1 on the "hydrogen cycle" produces water free from all dissolved salts.

A general chemical description of the composition character of the resins should precede a discussion on the nature of the effluents obtained in the resin chambers. Generally speaking, the primary materials for cation exchange are monovalent or polyvalent phenols and formalde-

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hyde. The acid adsorbing resin fundamentally is the condensation product of aromatic amines with aldehyde so are closely related to amine plastics. Strongly acidic or basic groups, such as alkyl sulfonic acid or alkyl polyamines or ammonium compounds are incorporated into cationic type resins. This material has wide limit range of exchange. To prepare them, sulfonic acid or phenols are condensed with formaldehyde. When pure paraphenol sulfonic acid is condensed with formaldehyde the sulfonic groups are torn off and are replaced with by oxymethyl groups. The resin formed contains only a fraction of the sulfonic groups of the original phenol and is a co-condensate of phenol and para phenol sulfonic acid.

To appreciate fully the significance of this new chemical development we should understand the basic nature of the exchange process. When a raw water containing ionizable substances passes through a cation removal unit all of the positive cations, i.e. calcium, magnesium, sodium, iron, copper, are removed from solution and hydrogen is substituted for them. The resultant dilute anionic acids pass under pressure to a second reactor tank where all the anions are adsorbed. This then leaves the water free of soluble solids as all sulfates, chlorides and nitrates have been adsorbed in the IR-4 bed. Carbonates and bicarbonates are first converted to carbonic acid which, being unstable, break up into CO and water.

$$Ca(HCO_3)_2 + 2\,HR = CaR_2 + H_2CO_3$$
$$CaSO_2 + 2\,HR = CaR_2 + H_2SO_4$$
$$CaCl_2 + 2\,HR = CaR_2 + 2\,HCl$$

$$2\,RX + H_2SO_4 = (RX)_2 \cdot H_2SO_4$$
$$RX + HCl = RX \cdot Cl$$

(X being acid binding substance)

In this illustration R designates the cationic resin exchanger and RX the anionic exchange medium with X the active acid binding substance.

By use of the exchanger method of removing soluble salts from a water supply it has been commercially possible to produce quantities of water under pressure that would be difficult and expensive to produce from steam stills. The quantity and hourly flow rate of water demanded by many chemical processes that have used ionic removal units would have required the addition of greater steam boiler capacity if the steam still had been employed for providing the necessary water. It would be interesting at this point to review some of the data accumulated from units in service.

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Installation A has been in service over two years in a porcelain enamel plant. The unit consisted of a 20″ x 72″ cationic reactor and a 16″ x 72″ anionic unit. The plant was guaranteed to turn out 3,000 gallons of water between regenerations at an hourly rate of 150 gallons. It was further guaranteed that the soluble salt content of the treated water would not exceed 10 parts per million. The private well water at this plant is changeable from season to season as far as total dissolved solid content is concerned. By means of the water treatment installation a de-ionized water of uniform quality has been provided.

The water that was used in the present work was pumped from a deep well. It showed a soap hardness that varied from 16 to 22 grains per gallon, depending on weather conditions. The hardness increased during dry weather. The enamel milled with this water came from the mill with a high set even though the usual setting-up agents were held low. It was necessary to age the ground coat almost exactly the same length of time each day or the water content would get out of line. Even with proper aging the set would sometimes break in the dip tank, which necessitated a further addition of calcium chloride, sodium nitrite, or some other electrolyte to restore the soluble salts to the ground coat that already contained too many soluble salts, making it still more erratic. There was also a marked tendency at times toward double draining.

To improve this condition a trial run was made, using distilled water in the ground coat instead of well water. Such a marked improvement occurred that distilled water was used in all ground coat for more than six months. A variation in the time of aging the ground coat could be as much as forty-eight hours without causing too much variation in the water content when it was brought to dipping weight. A slightly greater amount of the setting-up agent was required in the mill formula, but the resulting set was more permanent and subject to fewer variations with changes in temperature or variations in suspending qualities of clay which may affect the consistency of the enamel.

During troublesome period, that is, when there was undue fluctuation in water hardness, this plant was buying steam distilled water. The objection to this practice, of course, was the high cost of the water involved for milling purposes. De-ionizing equipment was installed and it was found that 100 gallons of synthetic distilled water was costing the same as one gallon of steam distilled water. No difference between the action of distilled water and de-ionized water on the ground coat was detected. It has also since been found that the use of de-ionized water

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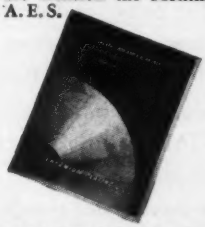

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in this plant eliminated other manufacturing difficulties such as those resulting from the reaction in water impurities and the metal during firing. This plant has had no difficult "Copper heading" which is a reaction often attributed to the sulphate content in hard water. This plant was able to reduce the number of rejects in the enamel room and savings were effected that off-set the cost of the equipment in a few months.

Installation B was chosen to exemplify the lower range of soluble solid content on which the resins have been found to be commercially effective. In one of the nation's foremost distilleries a battery of steam still units was producing more than 4,000,000 gallons of distilled water annually for the reduction of high proof spirits. Were it not for the extreme danger of contaminating their product it would have been ideal to use steam condensate for reduction. Examination studies of the condensate convinced the distilleries, however, that carry-over from the boiler plant plus soluble iron, picked up in return lines produced a variance in solids from 10 to as high as 60 parts per million. It was suggested that this condensate water be used as a raw supply to exchanger equipment as any undue changes in the supply would not effect the exchange qualities of the resins. This was done and the effluent was kept at temperatures below 93° F. The solid content of the final water averaged 1.5 parts per million.

Steam cost at this plant was estimated at 40¢ per 1,000 pounds and their cost of steam distilled water was computed to be $3.33 per 1,000 gallons. The Illco exchanger unit is producing 1,000 gallons of water at a cost of 16¢. The engineering group at this plant has reported a $14,265.00 saving on distilled water costs for the past year. In addition, the treated condensate tests, on the average, slightly over 1 ppm better than the water formerly produced in the steam stills. While this may be an extreme example of distillation economy it is interesting because first, water low in solid concentration shows no evidence of "leakage" through the Amberlite beds; and second, it is commercially feasible to use condensate as a raw supply to remove impurities that might endanger a chemical process because of mechanical additions of an impurity.

Installation C was erected in an East Coast plant engaged in the manufacture of mirrors. This installation consists of a 30″ diameter by 84″ cationic removal unit and a 20″ x 84″ anionic unit. In the silvering process it is necessary to have water comparable to distilled water in quality as the presence of minute traces of chloride precipitates silver chloride. Apparently this precipitate results in a cloudy reduction of metallic silver on the mirror. The plant in question desired to enlarge its output

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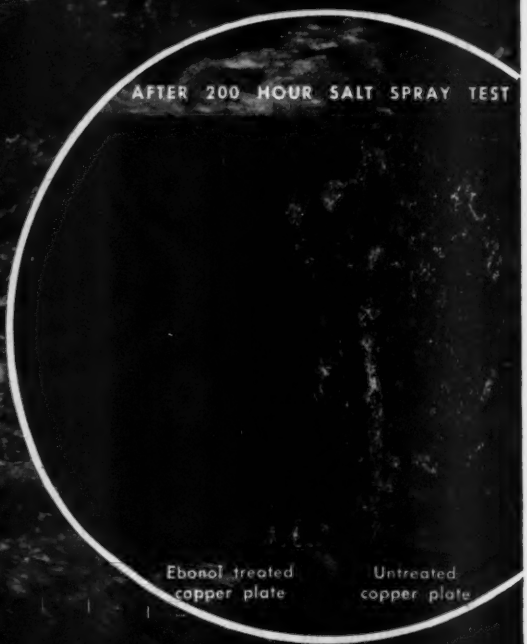

The above steel panel was copper plated 0.0002" thick. Half was Ebonol "C" treated and the whole panel was oiled. The unblackened section rusted at 16 hours and was badly rusted after 200 hours in salt spray. The Ebonol "C" treated half was almost perfect after 200 hours.

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of distilled water as it had been determined that a better production could be made if the glass prior to silvering could be rinsed with distilled water. It was estimated that 65% of the fuel consumption of the plant was consumed by the steam still and that if the new procedure was to provide more water it meant that additional steam boiler capacity would have to be provided as well as supplemental condensing equipment. Through the use of ion exchange equipment all of the demands of the plant have been met without changing the steam requirements.

Installation D is in a pharmaceutical house. It consists of a plastic-lined steel tank 54″ in diameter by 84″ for using 64 cubic feet of Amberlite IR-1. The anionic unit is 30″ in diameter by 72″ and contains 12 cubic feet of IR-4. The cationic removal unit is guaranteed to produce 65,000 gallons of treated water between regenerations. The plant operates at a rate of 1,000 gallons per hour and is guaranteed to produce water having a total salt content of ten or less parts per million. This is to include 2.05 parts per million of silica which is not removed by the exchange process. The water in this plant is used for a number of different purposes and they include the purification and washing of chemical products, the preparation of patent medicines, drugs, antiseptics, and the washing of ampoules. With an excess of pure water available, a number of new purposes were found for the high quality water which they are producing at 12¢ per 1,000 gallons.

Installation E was installed just a year ago in a Defense Plant in Florida. This plant is producing 60,000 gallons of water between regenerations at a flow rate of 3,000 gallons per hour. This plant is operating a large Anodizing Department for the oxidation of aircraft aluminum parts. They had followed the chromic acid method of oxidizing aluminum and found that in the hot rinse step following oxidation 15 grain water precipitated noticeable traces of calcium salts on the anodized piece. A de-ionizing unit was piped to the bath as well as to the chromic acid tank so that make-up due to drag out was maintained with salt free water. Whereas it was necessary to employ considerable help in the polishing of aluminum parts coated with calcium deposits, once the de-ionized water was used this costly step could be avoided completely. Completely salt free water, it was observed, was the only approach to the solution of this aircraft problem. Raising the sodium content of the supply or exchanging calcium for sodium in other zeolitic processes would have had aggressive chemical effect on the aluminum surface.

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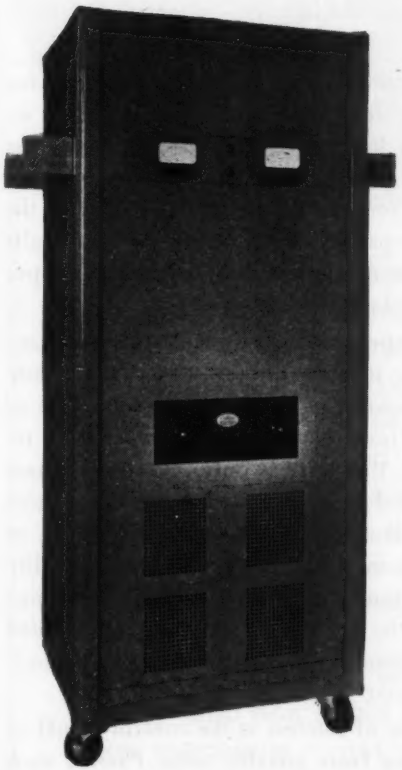

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From the above-mentioned applications it is quite apparent that the Amberlites are finding acceptance in many phases of water conditioning. It would not be prudent to present detailed data on these jobs at the present time. It can be understood, however, that de-ionized water is being used for the production of synthetic rubber, various catalysts, and in the manufacture of Silica Gel. It has been investigated by platers engaged in the electro-plating of silver and found to be very satisfactory for this purpose. However, although the use of the Amberlites in water conditioning is growing very rapidly and designates a large potential field of application, due attention should be given to the special fields of use.

Using the resinous exchange materials has provided new tools for research, and many interesting problems have already come to the attention of our Chemists. Although the reactions in almost every case involved are essentially the same, it has been noted that preferential adsorption of certain ions can be obtained. This work has led to the special adaption of the resins to the partial or complete removal of salts from sugar solutions, protein solutions, and to the recovery of copper and valuable metals in the electro-plating field.

The Amberlites are being used experimentally to determine the feasibility of recovering metallic silver in low concentrations from waste rinse waters in the silver plating field. This item is mentioned here as being typical of a number of field tests that could be conducted by research electro-chemists. Admittedly, this work is only in a development stage and there is no data accumulated to be presented at this time. There is considerable laboratory interest and pilot plant interest, however, in the adsorption of the silver ion, as an anion, as well as the possibility of adsorbing silver as a cation through a double hydrogen exchange unit. The removal of potassium in the hydrogen exchange unit, coupled with a double exchange of an additional hydrogen unit and an anionic unit to adsorb silver and the resultant HCn is being investigated.

Another possibility that should be of interest is the control of pH in electroplating solutions when plating from metallic salts. Passing such solutions through an Amberlite IR-4 bed has adsorbed excess acids formed in the hydrolization reaction without disturbing the metallic cation balance.

A third investigation is that of chromic acid adsorption and other plating contaminants in waste water as a means of controlling undesirable chemical additions in sewage disposal.

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It is gratifying to announce that the acid adsorbing resins are already being used commercially in the industrial process of de-acidification of formaldehyde and that the cation resin IR-1 has been proven on full commercial scale in the removal of cations in polyhydric alcohols and in the purification of sugar juices. The latter development may revolutionize the entire industrial sugar refining process.

The resinous exchangers have been called upon to extract tartrates from wine and wine slops. This work is being successfully carried out in a large winery in California, and the results indicate that the block in raw tartrates from the closing of shipping of the Southern Mediterranean countries can be broken by the use of these remarkable new chemical tools.

In referring to selective adsorption previously discussed in the paper it is of noteworthy interest to the Research Chemist that under certain conditions sodium carbonate occupies a high position in the scale of adsorption. One line of approach is cationic exchange in which the sodium is removed followed by aeration of the effluent to remove CO_2, the cation exchanger to work at high flow rates per square foot per minute.

Another typical problem encountered before the War related to the undesirable effect of the sodium ion in certain bright nickel solutions. Unfortunately, while it is quite possible to start a new solution with distilled water and sodium free salts it is not generally feasible to continue operation of the solution in such a manner as to preclude the possibility of the entrance of the sodium ion. However, by the use of de-ionized water one can furnish make-up water free of undesirable constituents, and where necessary, final rinse tank prior to entering the plating solution can also be a de-ionized water system so that drag in water may contain the minimum of these undesirable impurities.

As another example of the path to be followed by the research individual relative to the selective characteristics of the resins we might mention the care with which chromic acid is adsorbed. It may be quite possible to remove chromic acid contamination from nickel plating solutions without affecting the removal of other constituents.

Of interest in another phase of electroplating was an experiment conducted some time ago during the scarcity of nickel metal. The experiment involved the use of insoluble anodes and the maintaining of the metal content of the solution by means of nickel salts. Quite obviously as plating progressed the pH of the solution tended to decrease. Normally, one would adjust the pH of the solution by large additions of alkalis

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such as nickel carbonate. We endeavored to treat this problem from the standpoint of removal of the excess free acid as it was formed. This was accomplished by passing the solution through an anionic resin exchanger. The result was quite satisfactory in that a portion of solution, for example, having a pH of 4 could be, within a matter of several minutes, brought up to a pH of 6.0 with no difficulty. By adjusting the size of the unit and by other modifications it was felt that a continuous cycle could be established by which pH fluctuations would be eliminated. This made possible the use of nickel salts and insoluble anodes with no necessity for additions of alkali to control pH. The experiment was not put to commercial use because of the ban against nickel plating in general, and because of this ban, complete results were not obtained. However, it does indicate the unlimited nature of the problems which may be met by investigation of the characteristics of the Amberlite resins.

In none of the above cases do we wish to imply that the problems are solved. Each case is exploratory and the results are merely indicative of what may be investigated. The wide variety of resinous materials offer many interesting avenues of approach to the solution of the problems which have prevailed in the past and which may arise in the future in the field of electrodeposition.

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The Conservation of Chromic Acid In Chromium Plating

By C. T. THOMAS

Bureau of Engraving and Printing, Washington, D. C.

IN the last twenty years, chromium plating has developed from a laboratory experiment to one of the most important of metal plating processes. Because of its beauty, extreme hardness, and surface passivity, deposited chromium has found many and important uses. The low throwing power, low current efficiency, and the fume hazard associated with the chromic acid bath, which is used almost exclusively today, are defects which have been far overbalanced by the positive virtues of the chromium deposit.

The defects noted above were recognized at an early stage in the development of chromium plating. Since then there has been intensive research on all phases of the subject, but these defects remain with us, ameliorated only by the ingenious use of conforming or auxiliary anodes to improve metal distribution on the cathode, and by the use of adequate ventilating systems to evacuate the evolved gases and attendant chromic acid spray. Recent claims[1] ascribe high current efficiency to a sulfate bath used in electrolytic refining of chromium. If this process can be successfully adapted to the plating field, the problems of throwing power and spray evolutions would be solved automatically. Pending this much to be desired solution of our problems, any contributions to the easing of them is deemed desirable.

As is well known to all practical operators of the chromic acid bath, the voluminous evolution of gases at both electrodes results in a spray of fine droplets of chromic acid solution arising from the surface of the bath. If inhaled by the operator, these droplets come in contact with the membranes of the nasal system, causing sores known as "chrome Ulsers." This condition was early recognized as an industrial hazard, and all tanks are now equipped with ventilating systems which exhaust the gases and the spray along with them. Thus at a considerable cost and some inconvenience, this problem has been taken care of.

Some early attempts were made to find a simple and inexpensive means

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of preventing this spray evolution. Liquids of high surface tension, such as fish oil, and foams were tried as surface layers on the bath, but apparently the remedy was worse than the disease. The use of floating solid particles as a means of scrubbing evolved gases was suggested in another field, that of the electrolytic manufacture of sodium chlorate, some forty odd years ago. For several years floating rubber cubes have been used on the iron plating baths at the Bureau of Engraving and Printing. Their principal purpose is to reduce oxidation of ferrous salt, but they also serve to reduce spray evolution.

An application of this idea to chromium plating baths is discussed in a German article[2] in 1926. The use of cork particles and glass wool coated with paraffin are specifically mentioned and it was claimed that the use of an exhaust system was rendered unnecessary. The author is not aware of any application of this device to chromium plating in this country, but has found from his own experience that in some cases at least, it is well worth consideration.

For this purpose, particles of any floating solid that is not affected chemically under the conditions of use may be found satisfactory. Polystyrene has been found entirely suitable under ordinary conditions of operation, and there are doubtless many other materials equally satisfactory. The size, shape, and quantity of particles into which the blanketing material is divided will depend upon individual requirements. The size should be sufficient to cause the particles to detach readily by gravity from the wet plating surface, either on entry into or exit from the bath. For trial use, the shape will probably be a matter of convenience. For example, quarter inch round rods two or three inches long of polystyrene have been used for over a year at the Bureau of Engraving and Printing in the chromium plating of large flat surfaces. The use of a single layer of such rods produces a noticeably beneficial effect in reducing spray evolution, but by no means sufficiently to eliminate the need of exhaust ventilation over the tanks. The beneficial effect becomes greater with increased quantity of particles, but whether the quantity used can be increased conveniently to the extent necessary to render ventilation unnecessary as claimed above seems doubtful.

Using a single layer of particles of the size mentioned above, the violent up-rush of gases from the electrodes pushes back the particles from surface areas of greatest activity, apparently defeating the purpose of the floating layer. Nevertheless spray evolution is perceptibly diminished and operating conditions are thereby improved, with little or no

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inconvenience and at very slight expense. The principal advantage gained, however, lies in the saving of chromic acid. A careful check on a bath operated under commercial conditions, with adequate ventilation, showed that more metal was being lost in spray than was being deposited on the cathode. This loss was cut in half by the use of a single layer of polystyrene rods. Since the chromic acid bath is operated with lead anodes, and chromic acid is the sole source of the deposited chromium, it is obvious that the saving thus effected is of considerable importance.

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Rust Preventive

By J. S. NORRIS

Gilmore Oil Company

Rust Preventives are generally divided into two classes:

1. Hard Drying Coatings applied by common painting methods which dry within a short time to a hard, ductile film.
2. Non-drying Coatings ranging from fluid to solid consistencies.

We will confine our discussion to the non-drying type as they have an extremely wide range of application. Their popularity and great adaptability are based on such characteristics as the following:

1. Excellent protection.
2. Sufficient durability accomplished with economy.
3. Freedom from hardening or cracking, peeling, or slipping from the metal surface.
4. Ready removal of coating with petroleum solvents.
5. Since these coatings provide lubricating films, they need not be removed for many subsequent uses of the treated part.

Non-drying coatings, or "slushing compounds" as they were frequently called, have in the past consisted mainly of various oils, greases and petrolatums. They were the best products obtainable until some

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three years ago. While they proved adequate in many places, they left much to be desired. Experiments have proved that additional constituents must be present which, by chemical or other action, will offset the electrochemical conditions causing rusting.

Behind the development of the non-drying rust preventives is a long research program to perfect special rust preventive agents. This program has succeeded to the extent that now it is possible to obtain products which definitely inhibit rust formation.

These non-drying rust preventives are manufactured in four types:

1. Solvent Type.
2. Fluid Type.
3. Plastic Type.
4. Solid Type.

SOLVENT TYPE

The Solvent type contains a high percentage of Stoddard solvent as a vehicle into which has been incorporated the perfected rust preventive compound. Upon application, the solvent evaporates and leaves on the metal surface a thin, almost invisible but highly protective film. This solvent type should have the ability to displace water and neutralize the acid in finger-print stains. It is recommended only for indoor protection against both humid and acidic atmopheres. Coverage approximately 1200 square feet per gallon. Application by Dip, Spray, Brush of Swab.

FLUID TYPE

This type contains lubricating oil of various weights as the vehicle and gives somewhat better protection than the solvent type as it leaves an oily film rather than a slightly tacky film. Its ease of application and removal make this type desirable for indoor storage on small parts. Coverage approximately 650 square feet per gallon. Application by Dip, Spray, Brush or Swab.

PLASTIC TYPE

This type is particularly suited to dip applications of materials which are to be stored either indoors or out. The thickness of the film provided is sufficient to protect against the impingement of rain and makes this type entirely suitable for normal outdoor exposure.

The plastic type can be poured at normal room temperatures but may be heated for ease of application where desired.

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Miccrostrip is a combination of solvents and is used entirely as a remover. It is not a thinner. In addition to its use for masked parts it is very effective for the removal of other Miccro coatings such as those used for the protection of plating racks. Write for full details.

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Application is by Dip, Brush or Swab. Dip application coverage is approximately 200 square feet per gallon.

SOLID TYPE

This type is intended for outside use where severely corrosive conditions require a permanent, highly resistant, semi-hard coating. Instead of forming a firm dry coating which cannot be removed, this type produces a film which hardens slowly on the outside but remains soft and plastic next to the metal. It seals the pores of the metal, expands and contracts with changing temperatures, and effectively inhibits and prevents rust formation.

The solid type must be heated before using. Application by Dip, Brush or Swab and the coverage is approximately 80 square feet per gallon when applied at 175 degrees Fahrenheit.

To sum up, the Solvent type is most effective for indoor storage where small precision parts are to be protected for a period of several months. The Fluid type should be used on small parts also, but can be used where parts go into an assembly that does not require removal of the rust prevention. The oil film, of the fluid type provides a good lubricant which will protect the rubbing surfaces. The Plastic type is used for temporary outdoor storage or permanent indoor storage. It is easier to apply than the solid type so has a wider range of utility. It is also easier to remove.

The Solid type, which looks somewhat like a very heavy grease, is used where paints are not desirable but permanent protection is needed.

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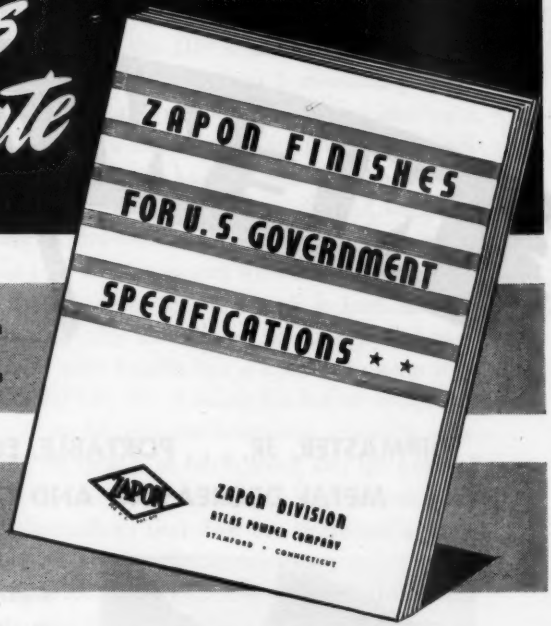

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Military requirements for finishes are frequently changing, therefore Zapon is in continuous contact with Government specifying agencies so that its information on specifications is always up-to-date. In turn our laboratories and the users of these finishes are kept constantly informed so they can keep abreast of developments.

Here's another example of the synergistic approach we have been talking about. It proves highly profitable all around and helps solve problems speedily. In this case synergism helps to recognize clearly the job to be done, the materials needed for the finish, the best procedure for fast production, how to get the best results at reasonable cost.

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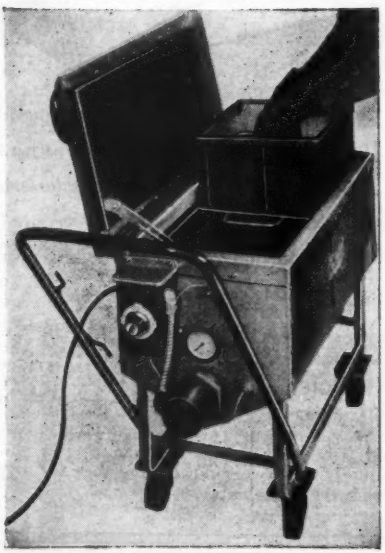

Fast economical cleaning and degreasing of metal parts and products is possible with the DIPMASTER, JR., a portable, insulated, electrically heated dipping tank, according to the manufacturer, Aeroil Burner Company, Inc., West New York, New Jersey.

Holding 12 gallons of solution, which is its normal capacity or 15 gallons maximum, the DIPMASTER, JR., is equipped with a heating element located inside on the bottom of the tank where it is completely submerged. Thus, there is no gap to jump between the heating element and the liquid itself. Average heating time from a cold start to boiling point (212° F.) is only 1¼ hours. This result is achieved by the above construction feature it is claimed.

Four casters (2 swivel type, 2 rigid), provide for easy maneuverability. It is ready for instant operation by simply plugging it in on 110 or 220 volt A.C. or D.C.

Standard equipment furnished with the DIPMASTER, JR. includes two dipping baskets, in which the parts are placed, each measuring 11¾" long x 11¾" wide x 8" deep; a bi-metal type thermometer registering a temperature range of 100-600° F. and a thermostatic control of the rigid, shock-proof type, equipped with a dial and knob to shut off the heating element manually and to maintain automatically any desired temperature between 100-550° F.; also a draw-off cock for emptying the tank.

In order to reduce heat loss to a minimum and thus enable the operator to get a quicker start in the morning, the steel tank is insulated all around the inner shell. This feature also contributes in savings on power consumption. An insulated cover with handle has a bracket to keep it in open position when the DIPMASTER, JR. is being loaded or unloaded.

The electric heating element can be removed whenever any cold solutions are used or the bottom of the tank is to be cleaned, and the head of this element as well as those of the thermostat and thermometer are mounted to the rear head of the tank so that they are protected against damage. They can be seen and adjusted while in operation.

Larger stationary models of the DIPMASTER, JR. are available, ranging up to 600 gallon capacity, and they are heated by kerosene, city or liquified gases, with removable immersion tube heating units in the tank so that the heat is delivered in the liquids as it is with the electrically heated DIPMASTER, JR.

METAL PLATING OF PLASTICS NOW DONE BY PRECISION PAPER TUBE CO.

A new process by which plastics, glass, or any non-conductor, is perfectly plated with any of the plating metals, is announced by Precision Paper Tube Company, Special Products Division, 2023 West Charleston Street, Chicago 47, Illinois.

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By Precision's new process the plating goes on the plastics as perfectly and as permanently as the best in any plated metal. Convex and concave surfaces, convolutions, corners and recesses are as thoroughly plated as flat or simple round surfaces. The metal plating is permanent. It does not crack, chip, nor peel off in long and severe service.

The advantages are many. Critical and strategic metals are conserved. Production costs are greatly reduced. Weight is saved. Design can be

much simplified. Dimensional stability is insured. Oils, solvents and moisture cannot be absorbed. Electrolytic corrosion between dissimilar metals is eliminated. Heat resistance is increased.

NEW WRINKLE FINISHES

A new line of wrinkle finishes, containing no Chinawood oil, has been developed by Maas and Waldstein Company, maker of industrial finishes, Newark, N. J.

These new "Victory" finishes closely resemble the standard wrinkle finishes, the manufacture of which is now restricted by government order for a few special applications and soon will be entirely prohibited, because of the Chinawood oil shortage. According to the manufacturer, the new finishes form hard, durable coatings, cover rough metal surfaces effectively in a single coat, and are applied in regular wrinkle patterns by the same methods. They are obtainable in a full range of colors and make this once widely-used type of finishes again generally available.

LACQUER & CHEMICAL CORP. ISSUE NEW FOLDER

Lacquer & Chemical Corporation of Brooklyn have just issued a new folder of 18 pages, on the subject of Facts About U. S. Government Specification Finishes. Helpful information is given such subjects as:

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Dope, Cellulose Nitrate, Pigmented, Non-Specular.

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Dope, Cellulose Nitrate, Clear.

TURCO REDI-PAINT PREPARES "HOT GALVANIZING" FOR PAINT

Permanent paint adhesion on galvanized metal — with no chipping or peeling — is ensured now by preparing the galvanized surface before painting with TURCO REDI-PAINT, according to the manufacturer, TURCO PRODUCTS, INC., of Los Angeles and Chicago.

In but a few seconds, TURCO REDI-PAINT passivates or "cools" the "hot galvanizing" so that paint will hold and the work can be kept in

lasting good condition. A unique feature of REDI-PAINT is color control — a dark tint develops on areas properly treated, leaving the untreated area conspicuously bright. With other treatments, there was constant backtracking because the solution so blended with the color of the metal surface itself that it was virtually impossible to determine accurately which section had been covered with the pre-painting covering.

Painters call galvanizing "hot" because it burns the paint and causes it to separate from the metal. Paint peels or chips from it due to two causes: (1) the smooth, spangled surface, and (2) the alkaline surface condition (zinc hydroxide) either present at the time of painting or developed beneath the paint film by penetration of moisture in service or storage.

Painters have long been aware of these conditions. Formerly they cooled the "hot" galvanizing with vinegar or other undesirable acids, which afforded only temporary protection.

Now with TURCO REDI-PAINT the surface of the metal is "chemically" changed, giving a permanent protection and base for the paint. The new compound does this by displacing the slick, oily surface typical of galvanized metal with a roughened, "toothy" surface to form a tight bond with the paint. It also neutralizes the alkalinity and passivates the metal instantly, forming an inactive film which will not become alkaline and which is resistant to corrosion.

TURCO REDI-PAINT can be applied by hand or by tank immersion. When applied by hand, the REDI-PAINT is simply wiped on full strength, or diluted with water, with a sponge or rag. When the proper color develops — which is a matter of a few seconds — squeegee off the surplus liquid and wipe with clean, dry cloths.

The dull, dark color, typical of the REDI-PAINT prepared surface, is proof of the passivated galvanizing which ensures permanent paint adhesion, thereby increasing a thousandfold the usefulness of the galvanized treatment now widespread for roofing, siding, railing, drainpipes, cornice work, refrigerator cabinets, structural shapes for power lines and many military applications.

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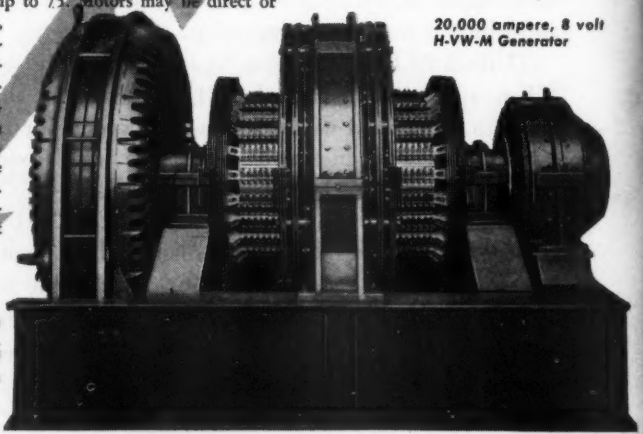

20,000 ampere, 8 volt H-VW-M Generator

For a complete discussion of generator efficiency, write for your copy of "Generator Design in Relation to Efficiency".

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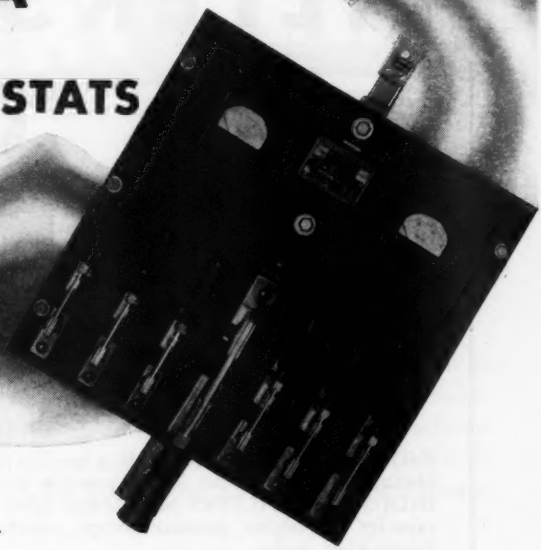
FORM "A" TANK RHEOSTATS



To insure accurate, uniform plated finishes, close voltage control is essential and is obtainable only with high quality tank rheostats.

Hanson-Van Winkle-Munning Tank Rheostats are not affected by changes in temperature and will never burn out under normal operating conditions. Heavier current-carrying parts and oversize nickel chromium resistor units are two outstanding improvements incorporated in the design of H-VW-M Tank Rheostats.

The H-VW-M Engineering Department is at all times available to work on special problems involving tank rheostats or any other plating and finishing equipment. Your inquiries on both standard and special rheostats are welcome.

Special desk type assembly of five H-VW-M Tank Rheostats, for control of five plating solutions.

and polishing equipment and supplies

VAN WINKLE-MUNNING CO.

Anderson, Indiana • • Bridgeport, Connecticut
Chicago • Cleveland • Dayton • Detroit • Elkhart • Matawan
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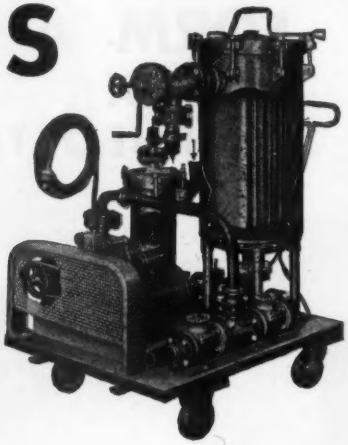
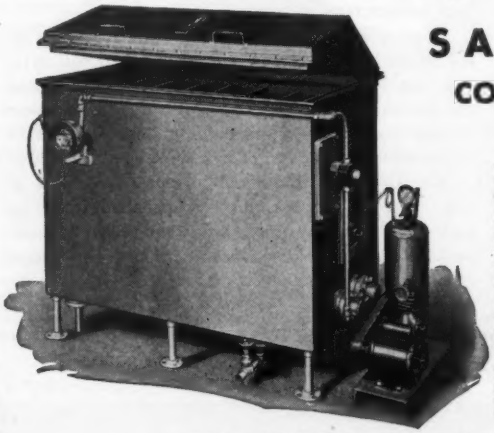
For

BRIGHT NICKEL
NICKEL
CHROME
COPPER SULPHATE
CYANIDE COPPER
BRASS AND ZINC
CADMIUM
HIGH SPEED COPPER
BRITE ZINC
SILVER
ELECTROCOLOR
AND OTHERS



INDUSTRIAL FILTERS will do a fine job of filtering and purifying your plating solutions, at the lowest possible cost per filtered gallon.
INDUSTRIAL FILTERS have larger filter areas, more sludge holding capacity and higher pressure pumps, which insures high flow rates and longer filter cycles.
The "LEAK-PROOF", "CORROSION-PROOF" and non-contaminating construction of Industrial Filters is a vital requisite of Electroplating filters.



SALT SPRAY
CORROSION TEST EQUIPMENT

For testing—Electroplated or coated metals at 95 deg. Fah. in accordance with Army, Navy and Aeronautical specifications, as outlined in Bulletin AN-QQ-S-91-5 dated Dec. 1938. Also for controlled temperatures at any degree. Testing Cabinets lined throughout with rubber. Made in 4 sizes.

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INDUSTRY NEWS

PRICE BECOMES SALES MANAGER MITCHELL-BRADFORD

Mr. William H. Price, Jr., was formerly Divisional Manager in charge of a large portion of the Eastern Seaboard territory for Mitchell-Bradford Chemical Company of Bridgeport, Connecticut, whose products, "BLACK-MAGIC" and SILCO are widely used in the treatment of both ferrous and non-ferrous metals for the purpose of creating a rust-resistant surfacing.

Mr. Price recently delivered a paper on "The Black Oxide Treatment of Steel" before the annual meeting of the American Electroplaters' Society in Buffalo, New York, and is well known among the trade, and industry.

"We hope," said Mr. Bradford, "by bringing Mr. Price into a position of national responsibility, to aid our general Industry as well as our own Company toward a still further relief in the criticalness of some of the more commonly used plating materials, many of which, in a variety of instances, have already been freed for more effective War Production work by the substituting of the black oxide treatment."

WANTED ELECTROCHEMIST

ELECTROCHEMIST needed to head up electrochemical research laboratory. Must be graduate chemist; post-graduate work in electrochemistry desirable. Laboratory-minded man essential for investigation and development of hard-chrome electroplating processes. Internal-combustion-engine and lubrication background helpful. Permanent opportunity in growing company with accepted process. Location: Cleveland, O. Adequate salary for right man. Write MONTHLY REVIEW, Dept. D.I.

DIVINE BROTHERS EARN STAR

The second meritorious production award was conferred upon Divine Brothers Company, Utica, New York, by the War Department in a letter of July 10, 1943, from Under Secretary of War Patterson. The citation adds a star to the original Army-Navy "E" flag awarded in October, 1942.

Both recognitions were made for unusual performance on special war contracts. Divine Brothers' peacetime products: buffs, polishing wheels, industrial casters and wheels, polishing and buffing lathes and special designed machinery are also going 100% into war channels, playing a vital part in creation of aircraft and other fighting equipment.

Conforming to Army-Navy preferences for star awards, no ceremony or special activity that might interfere with war production, took place. Employees, not present for the original award but now on the payroll, received their personal recognitions in the form of Army-Navy "E" pins.

SCHEIREY TRANSFERRED

Mr. Ernest B. Scheirey one of the New Jersey representatives for Oakite Products, Inc., has been transferred to the Waterbury territory.

ELECTROCHEMIST WANTED

Well established firm of good standing has an immediate opening for a qualified Electrochemist. Information may be obtained by writing MONTHLY REVIEW – Dept. A.

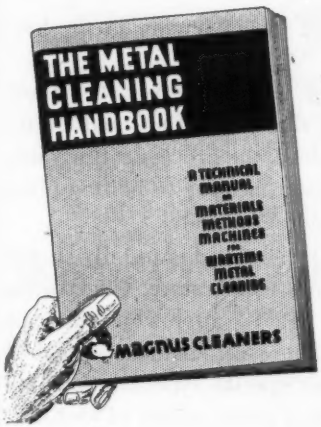
VERNON J. TWYNING PASSES

Mr. Vernon J. Twyning, Vice-President of the J. C. Miller Co., Grand Rapids, Michigan, died on June 28th. His passing is a deep sorrow to his associates and many friends in the industry.

THERE IS AN OXIDINE BLACK FINISH FOR EVERY SPECIAL NEED

The intensified demands of war industries for reliable and easily applied finishes are laying special emphasis on the Oxidine finishes and the Jetal process.

For brass and copper, Oxidine B is an excellent adhering hard black usable on alloys such as brass and electro plated copper and brass. No special equipment is needed – the salts are merely added to water,


THE METAL CLEANING HANDBOOK
A TECHNICAL MANUAL ON MATERIALS METHODS MACHINES FOR MAINTENANCE METAL CLEANING
MAGNUS CLEANERS

YOUR COMPLETE MANUAL on Metal Cleaning and Finishing!

Here is the complete manual on methods, materials and machines for metal preparation, protection and finishing.

Full of practical and immediately applicable ideas that will speed production, cut costs and improve quality of results in precleaning, washing, rustproofing, pickling, degreasing, burnishing, plating, painting, drying, cooling and similar operations.

Write for your Free Copy Now!

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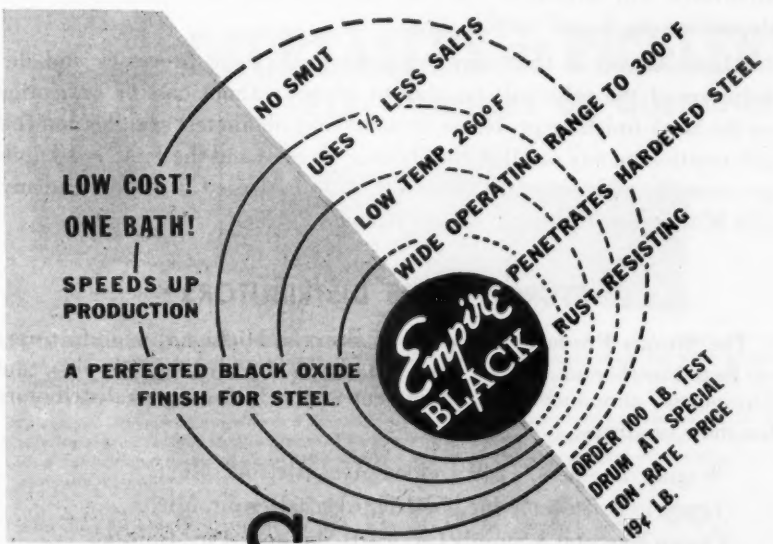

EMPIRE SOLVENTS CORP.
170 BROADWAY, NEW YORK 7, N.Y.

heated to 200°F. and the black is obtained by immersion in the bath for 3-15 minutes, depending on the alloy.

For zinc, Oxidine Z is recommended for its durable velvety-smooth adherent black. It is satisfactorily used on zinc die castings and electro plated zinc. Only simple equipment is required, the process calling only for the addition of the Oxidine Z salts to water, heating to boiling point and immersion of the objects from ½ minute to 2 minutes.

On cast iron, Oxidine CI provides an inexpensive and unusually simple method of obtaining a dense black finish at low temperature. The Oxidine CI salts are added to water and heated to 212°F., after which the cast iron parts are immersed for 5 to 10 minutes. One excellent and economical feature of this process is the fact that no special type cleaners are required and the application can be made to a great variety of cast iron parts with equal speed and facility.

For steel, the now well-known Jetal process is ideal, as an immersion black finish. This process, which has been widely used by industries for ten years, produces a deep penetrating black by a 5 to 10 minute immersion in a bath prepared by adding Jetal salts to water and heating to 285°F. When the Jetoil process is applied as an after finish, the surfaces so treated will withstand from 25 to 300 hours of salt spray by test, depending on the oil used.

Alrose Chemical Company, originators of these processes and distributors of the salts will be glad to advise without cost or obligation on the black-finishing problems. Readers may obtain test samples and full information on any or all of the Oxidine finishes and the Jetal and Jetoils processes by addressing the Research Staff of Alrose Chemical Company, 180 Mill Street, Cranston, Rhode Island.

STURGIS ADDS DISTRIBUTORS

The Sturgis Products Company of Sturgis, Michigan, manufacturers of Roto-Finish and various other Mechanical Finishing Supplies and Equipment, announce the appointment of the following as distributors for their products:

Wagner Brothers, 1249 Holden Ave., Detroit, Mich.
Frederic B. Stevens, Inc., 510 Third St., Detroit, Mich.
Crown Rheostat & Supply Co., 1910 Maypole Ave., Chicago
George A. Stutz Mfg. Co., 1641 Carroll Ave., Chicago.
Lasalco, Inc., 2820 La Salle Ave., St. Louis, Mo.

Sommers Bros., St. Louis
Munning & Munning, 202 Emmett St., Newark, N. J.
MacDermid, Inc., Waterbury, Conn.
W. D. Forbes Co., 303 Washington Ave. N., Minneapolis, Minn.
The Reynolds-Robson Supply Co., 4623 Paul St., Frankford, Philadelphia, Pa.
W. M. Fotheringham, 977 Niagara St., Buffalo, N. Y.

EARNEST A. LONG HEADS TURCO LABORATORY DIVISION

Appointment of Earnest A. Long to head the materials control department of the Turco laboratory in Chicago was announced recently by S. G. Thornbury, president and director of research, of Turco Products, Inc.

Mr. Long specialized in aircraft and allied industries research at the Los Angeles laboratory before being transferred to the Chicago division. Wartime demands for high speed efficiency in mass production have placed a tremendous stress upon chemical processes for metals. Hence Mr. Long, who will be in charge of the expanded Chicago laboratory,

DEGREASERS or PICKLERS

METAL WASHERS OR QUENCHERS

Whether it's Degreasers or Picklers, Metal Washers or Quenchers which you require for your war work, Blakeslee has a standard or ENGINEERED-FOR-YOU equipment for your problem. Regardless of the size of your production, we have the answer in the proper type of degreasing, washing, quenching or pickling equipment.

The above illustrated machine is a continuous pickle rinse, neutralizer and soaper for 20 mm. cartridge cases, either steel or brass. This machine will take a 2000 pound batch at one load or a continuous supply of cases. We would appreciate the opportunity of working on any problems you have.

G. S. BLAKESLEE & CO.

NEW YORK CHICAGO TORONTO

expects to devote a major portion of this work to metal surface preparations for the war industries.

Mr. Long came to Turco from the Aluminum Company of America. He is a native of Oklahoma, where he attended the University of Oklahoma, Chemical Engineering School.

BERRY TO REPRESENT EMPIRE BLACK

In the interest of extending better service and for the purpose of establishing resident contacts with important metal centers, Mr. H. Rudner, president of Empire Solvents Corporation, 170 Broadway, New York, announces the appointment — for Michigan — of the Edward F. Berry Company. The new office is located in Detroit at 6432 Cass Ave.

Mr. Edward F. Berry, head of the representing branch, will be in charge of sales and service for Empire Black — a new perfected black oxide finish for steel.

Mr. Rudner, in referring to Empire Black, describes the product as a non-smut, rust-resisting, low-cost, low-temperature (260° F.) one-bath process that uses one-third less salts — has a wide operating range (up to 300° F.) and penetrates hardened steel.

GLASSTONE BOOK COMING!

At convention time we were promised delivery of the Glasstone Book in two weeks. Since then we have had delay after delay both from the bindery and the carton manufacturer. We are sorry so many have written and wish we could have shipped the books as originally promised. However, we are now assured of delivery by August 5th and your copy will go out promptly thereafter. These are strenuous days and getting a delivery as promised is very difficult. Please bear with us. Incidentally, due to paper restrictions it is certain we cannot bring out a second printing until next year. The first printing is going fast . . . better get your order in now to make sure of getting a copy.

FOR SALE Available for Immediate Shipment

3—5000/2500 AMPERE, 6/12 VOLT, **A. P. MUNNING CO. "OPTIMUS"** Motor Generator Sets. Full Panel-Board Arrangement. Excellent Condition.
3—5000/2500 AMPERE, 6/12 VOLT, **EAGER ELECTRIC CO.** Motor Generator Sets. Excellent Condition.
1—5000 AMPERE, 6 VOLT, **HANSON & VAN WINKLE CO.** Interpole Design, Double Commutator Motor Generator Set. Excellent Condition.
1—4000/2000 AMPERE, 6/12 VOLT, **EAGER ELECTRIC CO.** Motor Generator Set. Excellent Condition.
1—3500/1750 AMPERE, 6/12 VOLT, **EAGER ELECTRIC CO.** Motor Generator Set. Excellent Condition.
1—2000/1000 AMPERE, 6/12 VOLT, **EAGER ELECTRIC CO.** Motor Generator Set. Excellent Condition.
1—1500/750 AMPERE, 6/12 VOLT, **BENNETT & O'CONNELL** Motor Generator Set. Full Panel-Board Arrangement. Excellent Condition.
1—1000/750 AMPERE, 6/12 VOLT, **MUNNING "OPTIMUS"** Motor Generator Set. Full Panel-Board Arrangement. Excellent Condition.
1—1000 AMPERE, 6 VOLT, **IDEAL ELECTRIC CO.** Motor Generator Set. Excellent Condition Throughout. Full Panel-Board Arrangement .
1—1000 AMPERE, 8 VOLT, **JANTZ & LEIST** Motor Generator Set. Excellent Condition.
1—750/375 AMPERE, 6/12 VOLT, **BENNETT & O'CONNELL ELECTRIC CO.** Motor Generator Set. Full Panel-Board Arrangement. Excellent Condition.
1—750 AMPERE, 6 VOLT, **HANSON & VAN WINKLE CO. BELT-DRIVEN GENERATOR.** Complete with Panel-Board.
1—750/375 AMPERE, 6/12 VOLT, **CHARLES J. BOGUE** Motor Generator Set. Excellent Condition. Full Panel-Board Arrangement.
1—500 AMPERE, 30 VOLT, **WOTTEN ELECTRIC CO.** Motor Generator Set for Anodizing. Full Panel-Board Arrangement. Excellent Condition.
2—**GARDNER MACHINE CO. No. 4 Size,** Ball-Bearing, Motor-driven Polishing and Buffing Lathes. "V" Belt Drive.

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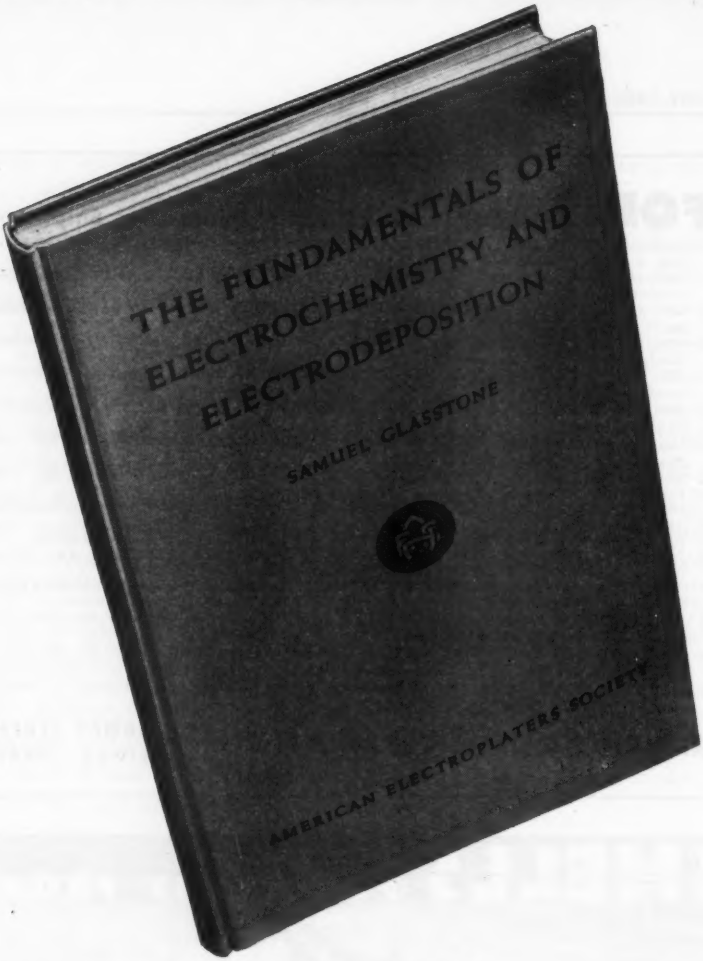

INDISPENSABLE TO *Practical* ELECTROPLATERS

A.E.S. announces publication of "The Fundamentals of Electrochemistry and Electrodeposition" . . . by Samuel Glasstone!

With this announcement, A.E.S. initiates another new, needed, vitally important service. This — and similar manuals to follow — condense into compact, practical handbook form — the authentic essentials of the science of electroplating. Dr. Glasstone's book is a compilation of the much-discussed series of articles which appeared, during the past year, in the *Monthly Review*. But the material has been completely revised in the light of latest war-time developments . . . to provide practical, daily usefulness to schools, colleges, and every serious electroplater!

Handsomely printed, richly case-bound, over 100 pages 5¼x8¼ and priced at only $2.00 per copy, as an educational feature of A.E.S.

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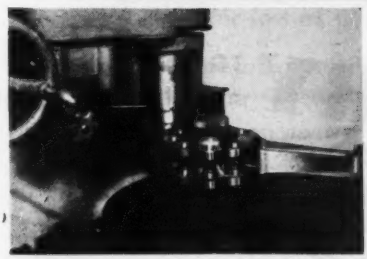

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Special Burring Methods, Compounds and Abrasives, Oil-Dri Anti Slip-Treatment for Oily Floors. Not only absorbs oil, but is fireproof.

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4A CEMENT and THINNER — Used for setting-up wheels, belts, buffs, rolls — they are free cutting, long lasting and economical when set up with 4A Cement.

COLORING ROUGES — Uniform, carefully graded raw materials, expertly compounded by Harrison's technicians, insure rouges that give high luster, and faultless finishes.

POLISHING COMPOUNDS — 4A symbolizes SUPERB PERFORMANCE, which you will find in our compounds for CUTTING, CUT AND COLOR, AND MIRROR FINISHING all kinds of steel including stainless, carbon steels and hard-to-buff alloys.

SAMPLES ON REQUEST

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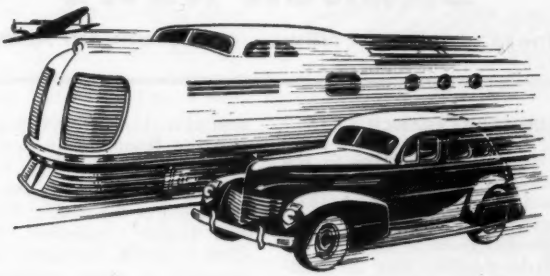

Tanks Need Reserve Power, Too

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Tanks also need reserve strength when high plating production schedules are to be maintained. The small margin of cost represented by the use of better materials and expert weldmanship is cheap insurance against early corrosion failures, with attendant loss of production.

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BRANCH NEWS

Business and Social News · Educational Activities

BRIDGEPORT BRANCH

The regular monthly meeting of the Bridgeport Branch of the American Electroplaters Society was held June 4, 1943, at the Chamber of Commerce Rooms, Stratfield Hotel. President Arthur McNeil opened the meeting with 26 members present, including Jack Buckman from the New Haven Branch.

The roll call of officers was read and all were reported present. The minutes of the previous meeting was read and accepted.

Reports of Special Committees: The Exhibit Committee reports that their work is completed.

Reports of Standing Committees: F. B. Gotthardt, Chairman of the Sick Committee, reports no sickness.

Larry Griffin, member of the Technical Session Committee, reports a round table discussion scheduled for the June 4th meeting.

Hubert Goldman, Chairman of the Membership Committee, reports three prospective men for membership. Applications for these men will be introduced at the next meeting.

The delegates to the Buffalo Convention have received their final instructions and the Branch approved to pay their registration fees.

Communications: A letter from L. E. Raymond of the Singer Co., Bridgeport, and Eugene Schimmel, of East Porchester, asking for change in status from associate to active membership, reason given both parties now actively engaged in plating, anodizing and finishing. The request was granted by the Branch in view of the above mentioned facts.

A letter from Wm. Flaherty thanking the Branch for electing him as an Honorary Member of the Branch with the kindliest of appreciation.

A letter from Harold J. Walsh enclosing a bond covering the Secretary and Treasurer of the Branch.

Applications for Membership: None.

Balloting for Membership: Charles A. Seiser—Contract Plating Co., Stratford, Conn., Active Member; Gerald DeRosa—Contract Plating Co., Stratford, Conn., Associate Member.

Unfinished Business: Arrangements were made and completed with Harold J. Walsh for the insurance of the picture, sound projector and accessories for the amount of $500.00.

New Business: No meeting to be held in July or August, 1943. Motion was made and passed to hold an outing sometime in September, 1943, and to appoint a committee. President McNeil appointed the following men to serve in this committee: A. R. McNeil, Chairman; Wm. Ehrencrona, C. C. Helmle, Frank Rock, J. G. Sterling.

Bills against the Branch were ordered to be paid.

Good of the Order: Dr. Walter R. Meyer reported that the Branch Exhibit to the Convention in Buffalo has been shipped.

The Treasurer's report was read and accepted.

In the absence of Librarian Charleson, C. C. Helmle conducted the round table discussion on various subjects of the Metal Finishing Industry.

The meeting adjourned at 10:30 P. M.

JOSEPH G. STERLING, *Secy.-Treas.*

NEWARK BRANCH

The Newark Branch, A.E.S., held its regular meeting on Friday, June 18th, 1943, at the Hotel Robert Treat, Newark, New Jersey. The meeting was called to order at 8:30 P.M. by President William Bruhns. All other officers were present.

The minutes of the previous meeting were read and approved.

The Secretary gave a detailed report of the Buffalo Convention which was supplemented by Horace H. Smith and Edward Washburn.

A demonstration of the usefulness of a Magna Gage to measure electro plated coats on ferreous metals was given by George Wagner. He also exhibited numeous samples of steel articles which had been zinc plated and chromated showing some of the results obtained from a chromate solution containing 26 ozs. of sodium dichromate and 0.8 ozs. of sulphuric acid per gallon of water. The magna gage was used on these articles to determine the thickness of the deposit.

Our Librarian, Edward Washburn, presented Mr. Grover of the Aeroil Burner Company, Inc., who exhibited some of their equipment which can be used for heating, cleaning and degreasing various metal parts. The Aeroil "Heet-Master" removes oil, grease, dirt, tempering materials, buffing compounds,

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DEBURRING, BRUSHING, POLISHING MACHINES FOR
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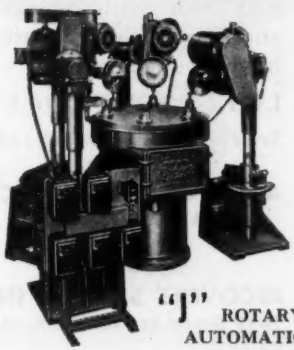

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POLISHERS—3 to 7½ HP.
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Models 1 to 50 HP. for every application

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"YANKEE BRAND"
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brushed and baked enamels from metal products. It prepares metal parts for lacquering, vitreous enameling, rust-proofing, plating, heat treating, etc. The "Heet-Master" acts as a paint stripper and metal finisher. After Mr. Grover gave his demonstration he was asked numerous questions. Mr. Grover was given a rising vote of thanks by all the members who attended.

There being no further business the meeting was adjourned.

A social meeting was held after the regular meeting was adjourned to which the Ladies Auxiliary was invited. Refreshments were served at this time.

GEORGE WAGNER, *Secretary*

MONTREAL BRANCH

The regular meeting of the Monttreal branch of the A.E.S. was held on Monday July 12th at the Mount Royal Hotel. The meeting was called to order by our chairman Mr. J. Reisenberg. The minutes of the previous meeting were read by the Secretary and adopted.

It was with regret that we accepted the resignation of Mr. E. Feeley from the position of Chairman of the Membership Committee but owing to the pressure of defense work he felt he could not do justice to the office and Society. We are looking forward to the time, Gene, when things are more settled and you again in active office.

Mr. Wm. Gauvin, our second Vice-President, was appointed Chairman of the Membership Committee. "Good Luck, Bill."

The chairman now turned the meeting over to our librarian, Mr. E. H. Marsh, who proceeded to give us a very complete though condensed resume of the papers presented at the convention, this was thoroughly enjoyed by an excellent and attentive membership. Mr. J. H. Feeley also contributed to an enjoyable evening by reporting the proceedings at the delegates meeting on Wednesday afternoon and the good work he accomplished while at the convention. "Good work, John, we are with you. Keep it up."

Mr. Marsh now introduced the speaker for the evening, Mr. Wm. Gauvin. The speaker started out to give us a short talk on Elementary Electrochemistry, but such was the interest shown that the chairman was forced to call the meeting

to order. This was due to the questions our old friend Albert Lariviere, who was present after a long absence, persisted in asking. Bring along some more questions, Larry, next month.

Mr. Gauvin has promised to continue his lecture at our next meeting. The chairman adjourned the meeting at 11.15 P.M.

WM. G. FINLAY, *Sec.-Treas.*

PHILADELPHIA BRANCH

President Verrell called the meeting to order and the Secretary called the roll.

The minutes of the previous meeting were approved as read, including the annual financial report.

The applications of Harry Brown and Benjamin Minkin, actives, also Don P. Volino, associate, were referred to the Board of Managers.

Allen H. Okamoto, active, was elected to membership after approval by the Board of Managers.

Several communications were read and order filed, except one from the Colonial Stove Co., in which a question was asked and the Secretary was requested to write them to ask said question in an open meeting.

The bills were ordered paid.

A motion to dispense with the July and August meetings was passed.

Delegate Gene Zurbach, Jr., gave a very educational report about the convention, assisted by A. G. Snow, T. J. Connor, C. K. Goss and Harry Brown.

There were spirited discussions on Cronak, Rapid Silver Plating, Stainless Steel (Zinc Plating), Porous Chrome, and Fletcher Hard Chrome.

The meeting closed with a rising vote of thanks to Delegate Zurbach and his able assistants.

PAUL MENTZER, *Secretary*

CLEVELAND BRANCH

Minutes of the meeting of the Cleveland Branch of the American Electroplaters' Society held in the Cleveland Hotel on Saturday evening, June 5, 1943.

The meeting was called to order at 7:30 P.M. by our President, Mr. William E. O'Berg.

The minutes of the May 7, 1943, meeting were read and approved as was also the financial statements of May 6th and

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The ROBERTS ROUGE COMPANY

STRATFORD CONNECTICUT

April 3rd, 1943.

The applications of Mr. Cliff L. Pickett of Meadville, Penna, as Associate, Mr. Ruel K. Shumway of Cleveland, Ohio, as Active were read and referred to the Board of Managers.

The following applicants whose names were read at the April 3rd, 1943, meeting and which appeared in the May 1943, issue of THE MONTHLY REVIEW were elected to membership: Mr. Stanley J. Atma of Cleveland Hts, Ohio, as Associate, Mr. Frederick G. Barker, Jr. of Cleveland Hts, Ohio, as Associate, Mr. Clarence H. Meyer of Westlake, Ohio, as Active, Mr. Joseph Saletel of Cleveland, Ohio, as Active.

After some discussion it was decided to hold the Annual Outing and Picnic on Saturday afternoon, July 17 at Sunny Brook Gardens, Smith and Hummel Roads, Cleveland, Ohio. Admission will be by ticket only. Mr. Steve Miller assured us that there would be plenty of beer this year, also stated that the price of the tickets would be $1.50 per person.

It was announced by the chair that there would not be any meeting in July, also that the next regular meeting would be held in August.

The speaker of the evening, Mr. Charles Cohn, of the Colonial Alloys Co. was then introduced. Mr. Cohn was ably assisted by Mr. Harold Erstrom of the same company. Their talks were on improved methods of Electroplating and Anodizing of Aluminum which they illustrated for us with small baths also many samples. These proved very instructive and after a rising vote of thanks to both speakers, the meeting adjourned at 11:15 P.M.

GEORGE B. SVENSON, *Sec.-Treas.*

CHICAGO BRANCH

The regular monthly meeting of Chicago Branch was held Friday, July 9, 1943 at the Atlantic Hotel.

President R. J. Hazucha presiding and all other Officers present. Mr. W. J. Erskine our second Vice President invited all our members to a meeting of the Rockford Group, on Monday, July 12, to hear the paper by Mr. W. S. Morrison on the treatment of Water. Mr. Erskine also invited the members to their picnic on Saturday, July 17th.

President R. J. Hazucha introduced the guest speaker of the evening Mr. R. Goodsell of the Racine Polishing & Plating Co. of Racine, Wis., who made a very interesting and instructive talk on the "Applications of Hard Chrome Plating." Ray answered the many questions asked by those present so promptly that it proved he was the master of his subject. Ray is a past National President of the A.E.S. and a member of Milwaukee Branch and several years ago was a member of Chicago Branch.

Mr. Fred Fulforth also a past National President of the A.E.S. was a visitor at this meeting and his many friends were glad to see him.

The delegates reports on the Buffalo convention were read, accepted and placed on file.

J. W. HANLON, *Secretary*

SPRINGFIELD BRANCH

The regular monthly meeting of the Springfield Branch, American Electroplaters' Society, was held on April 26th at the Hotel Charles, Springfield, Mass. The meeting was called to order by President Prouty.

The secretary read a letter from C. Helmle, Chairman of Exhibits for the National Convention in which he explained the rules for the photographic exhibit to be held at the Convention. Prospects for the Springfield Branch entering the exhibit were discussed and it was decided that we would not participate this year.

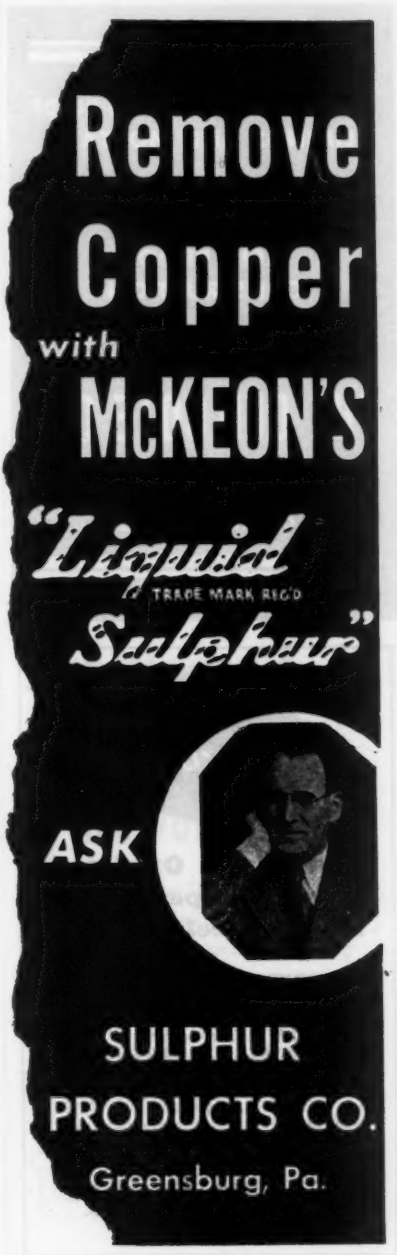
Mr. Costigan explained the final plans for the Regional Convention. Every one was urged to attend and bring his wife and friends.

Mr. Niles, chairman of the nominating committee, read the following slate of nominees for the 1943-1944 branch officers:

President, Norman Plank; Vice-President, Arthur Zavarella; Secretary-Treasurer, Derick Hartshorn, Jr.; Librarian, Frank J. Clark. Board of Managers, T. J. Murray, Harold Narcus and William Hanford.

The following delegates to the convention were appointed: Norman Plank, William Seidel and Arthur Copp. Alternates: Harold Narcus, Colin Hastie and William Hanford.

Mr. Prouty then introduced Mr. E. A.



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Waterbury, Conn.

Anderson, Engineer of the New Jersey Zinc Co., who gave a very interesting talk entitled "The Cronak Finish." Following are a few of the high-lights brought out in the talk: Stagnant water rather than fresh water accelerates the corrosion of zinc. The annual production of zinc in the United States is about 1 million tons. Cadmium, 3,000 tons. The cronak finish does not improve the corrosion resistance of zinc when exposed outdoors or in commercial atmosphers. When subjected to heat the cronak film breaks down to form Zinc chromate. This is neither an inhibitor for zinc or a paint base on zinc. The cronak finish is formed by simple immersion for 10 to 20 seconds in a cold solution of Sodium Dichromate 200 g/l and sulphuric acid 6 to 9 cc. the temperature should not exceed 80° F. Contrary to general belief the solution activity on the zinc ceases when the pieces are pulled from the tank and does not continue until they are rinsed. There is no dermitis hazard from the film, only from the solution.

It should always be rinsed in cold or cool water and air-dried. 24 hours aging increases the corrosion resistance of the film. One gallon of solution will treat approximately 75 square feet of zinc. The solution may be rejuvenated once anyway by a small addition of sulphuric acid. The film may be stripped by immersion in a boiling solution of 200 g/l of Chromic Acid slightly acidified with a little sulphuric acid. The thickness of the zinc removed ranges from .000003" to .0001" depending upon the alloy, concentration of the solution and immersion period. Because different shades are formed upon different alloys the color of the finish is no guide to the inspector. The composition of the film is essentially basic Chromium Chromate. The protection is afforded by the leaching out of the hexavalent chromium.

D. S. HARTSHORN, *Secretary*

PITTSBURGH BRANCH

The Pittsburgh Branch held their last meeting this spring May 6th at the Fort Pitt Hotel. Following the election of officers and delegates as reported on the attached forms Mr. R. A. Dimon of Carnegie Illinois Steel Company presented a paper on "Electrotinning of Sheet

Metal." This paper attracted the largest group of the year to our monthly meetings.

At our April meeting we had a discussion on the Controlled Materials Plan by two representatives of the W.P.B. Following this discussion Mr. G. A. Jersey of the Pittsburgh Branch gave a paper on Hard Chrome Plating which was very well received.

FRANK R. KELLER, *Secy.-Treas.*

NEWARK BRANCH

The Newark Branch, A.E.S., held its regular meeting on Friday, June 11th, 1943, at the Hotel Robert Treat, Newark, New Jersey. President William Bruhns called the meeting to order at 8:45 P.M. All other officers were present.

The minutes of the previous meeting were read and approved.

Application for Roland John Holden to Associate Membership was voted to take the regular course.

The question of the summer month meetings was brought up and it was decided that we hold only one meeting per month during July, August and September, the date being the 3rd Friday of each month.

There being no further business the meeting was turned over to our new Librarian, Edward Washburn. There was no speaker for the evtning but Mr. Washburn gave us a practical demonstration of Electro Letic methods and analysis of Zinc Solutions. This method can also be applied to other solutions. He next gave us a demonstration of Electro Polishing which was extremely interesting. He exhibited a complete unit of a miniature rectifier and plating equipment. After hooking up this unit he proceeded to electro polish some of the stainless steel parts which he brought with him and it was surprising what he accomplished in a few minutes in the electro polishing solution. Only 19 members attended this meeting so Mr. Washburn was asked to give the same demonstration again at a later date, at which time all the members will be notified. Our President proposed that we give our Librarian a rising vote of thanks.

There being no further business the meeting was adjourned at 11:00 P.M.

GEORGE WAGNER, *Secretary*

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THE ABSTRACT SECTION

MAURICE R. CALDWELL

Chairman Program and Educational Committee

The Diffusion into Steel of the Atomic Hydrogen Resulting During Pickling in Acid Solutions. By PAUL BASTIEN. *Compt. Rend.* **214,** 355-7 (1942); *Chem Abstracts* **37,** 2319 (1943). Cold-hammered iron, after pickling in 10% HCL. liberated much more hydrogen when placed in water than did annealed iron. The hydrogen absorbed on or near the surface appears to come off rapidly; then the hydrogen which has penetrated more deeply escapes more slowly. The effect on Brinell hardness, breaking strength, elastic limit, and electrical resistance are discussed.

ERNEST H. LYONS, JR.

Properties and Advances in the Use of Hard Chromium Plate. By K. GEBAUER. *Oberflachentech.* **18,** 2-3, 11-13, 19-22, 31-3 (1941); *Physik. Ber* **22,** 1359 (1941). A discussion of current efficiency vs. bath temp., c.d. and acid concn.; evolution of H and its effect on brittleness; removal of H by heating; effect of Cr plating on strength of various metals; difficulties in detecting microscopically the cryst. structure of Cr; contraction cracks in HCl soln. and insoluble occlusions; correlation between conditions for Cr plating and surface properties of the plated metal; effect of the structure of the plated basis metal on the plate; difficulties in judging the plate by its appearance; determination of the penetration-hardness and scratch-hardness of Cr plate; Cr plate and corrosion protection of motors, pumps and valves; hard Cr plate for surface hardening of Al and its alloys.

M. HOSEH, *Chemical Abstracts*

Addition Agents in the Electrodeposition of Tin. By ROBERT TAFT and JOHN K. FINCKE. *Trans. Kansas Acad. Sci.* **45,** 173-88 (1942). Only tetrabromo-cresol-sulfonephthalein, Ag nucleinate and Ag proteinate had any effect in smoothing deposits. Specific adsorption effect is the only explanation offered.

GREGG M. EVANS, *Chemical Abstracts*

Electrolytic Refining of Nickel. By N. P. FEDOT'EV. *J. Applied Chem.* (U.S.S.R.) **15,** 5-24 (1942); *Chem. Abstracts* **37,** 1934 (1943). In nickel electrodeposition, current efficiency is favored by increases in $NiSO_4$ concentratoin, pH, c.d., and temperature. Iron in the solution makes the deposit harder; with 3-4 g./l. the nickel deposit cracks and peels; copper above 0.5% causes dark spots and spongy growths; zinc at over 0.01 g./l. causes dark spots. The electrolyte must contain sufficient nickel, enough chlorides to avoid making the anodes passive, and a buffer, such as H_3BO_3, to maintain the pH. Sodium salts give better nickel deposits than do ammonium salts.

ERNEST H. LYONS, JR.

Electrodeposition of Palladium. By M. A. KLOCHKO and Z. S. MEDVEDEVA. *J. Applied Chem.* (U.S.S.R.) **15,** 25-46 (1942). The authors give a history of electrodeposition of Pd starting with 1841. Fe and Al are unsuitable as basis metal, while Cu, brass and Ag are entirely satisfactory; Ni is satisfactory under special conditions. Deposition from H_2PdCl_4 is unsatisfactory; partial solution of both cathode and anode occurs, with formation of an immersion (displacement) deposit on Cu, which weakens the adhesion. Deposition from $(NH_4)_2PdCl_4$ gives porous and thin deposits, that darken and turn yellow in the air. NH_4Cl (10-100 g./l. and $(NH_4)_2PdCl_4$ (1-2 g./1.) at room temperature with c.d. 0.3 ma./sq. cm. (0.3 amp./sq. ft.) gives shiny deposits, which do not require polishing. However, here also some displacement deposition occurs, which weakens the bond between Pd and basis metal. Deposit thickness ranges from 0.01 to 0.5 u (.000004-.00002″); attempts to increase this were unsuccessful. In baths containing Na and K chloropalladites, displacement deposition occurs even with current flowing; with max. c.d. of 0.3 ma./sq. cm. and duration of 10 min. (beyond which soln. of Cu occurs and the Pd deposit is spongy) it is impossible to get deposits over 0.1 u (.000004″) thick. With Pd amminonitrite baths in presence of NH_4NO_2 and NH_4OH it is possible to obtain good deposits of various thicknesses. Thin deposits are lustrous; the thicker ones require polishing, but the current efficiencies are low and deposits are porous. The Mond and Raper bath (Brit. pat. 370,539) yields shiny deposits up to 2 u (.00008″); thicker deposits crack if duration of plating is too long. The Mond and Atkinson bath (Brit. pat. 381,931) yields durable deposits, and requires little polishing. A later Mond and Raper bath (Brit. pat. 408,244) yields satisfactory thin deposits of high luster but the current yield is low, and thick deposits cannot be obtained. The phosphate bath, suggested by Pfanhauser in 1914, yields shiny but rather porous deposits suitable for decorative purposes. Removal of Pd from Cu, brass and Ni is difficult. Anodic soln. in dil. HCl is fairly satisfactory. Pd does not dissolve but is loosened and can be removed mechanically.

G. M. KOSOLAPOFF, *Chemical Abstracts*

Origin of Pits in Electrolytically deposited metals. By GEORGE THOMAS. *Compt. Rend.* **214,** 480 (1942). Pitting is attributed to the presence of finely divided fatty material in the bath. As soon as pits appear, 0.10-0.15 g./l. $KMnO_4$ is added to the electrolyte, and the soln. kept at 90° (204°F) for 15 min. As an alternative to heating, 4 hrs. of agitation in the cold can be used. Pitting thereupon ceases.

CYRUS FELDMAN, *Chemical Abtracts*

Electrodeposition of Iron. By L. KRIEGER. *Bull. soc. franc. élec.* (6), **2,** 221-6 (1942). In the electrodeposition of Fe the evolution of H is to be avoided, as it greatly interferes with the deposition of a smooth, fine-cryst. deposit. The pH of the bath should be kept at about 7. Chloride baths are preferable to sulfate baths. SO_4—going to the anode is more likely to form H_2SO_4 than $FeSO_4$. If the anode contains any C it will be dissolved with a resulting lowering of the PH. The heats of formation of $Fe(OH)_2$ (in sulfate solns.) and of H_2O are almost the same, 68,900 and 69,000 cal. resp., whereas the heats of formation of $FeCl_2$ and 2HCl are 100 and 78.5 kg.-cal., resp. Thus, in the former case there is a tendency to equil. between the liberation of Fe and H at the cathode.

M. HOSEH, *Chemical Abstracts*

Cathodic Polarization of Zinc. By O. ESIN. *Acta Physicochim.* (U.S.S.R.) **16,** 102-19 (1942) (in English); *Chem. Abstracts* **37,** 2273 (1943). Studies of the polarization in the plating of zinc on a mercury jet cathode indicated that the deposition process was slow, and that time is required for complex ions, such as zincate or cyanide, to dissociate before the zinc can deposit. The dissociation is much more rapid on a zinc cathode than on mercury.

ERNEST H. LYONS, JR.

BOOK DEPARTMENT

BOOK REVIEWS

By

DR. GEORGE DUBPERNELL, *United Chromium, Inc.*

Aircraft Materials and Processes. GEORGE F. TITTERTON. Revised and enlarged edition. 340 pages. Pitman Publishing Corporation, New York City, 1941. Price $3.50.

The author states in the preface that . . . "the latest materials and processes used in aircraft construction have been described from a utilitarian point of view. Numerous suggestions have been included on the choice of material for a particular job and on the best way of working, heat treating, and finishing materials for specific applications." This describes the book in general terms, but is in many respects inadequate. The author is connected with the Gruman Aircraft Engineering Corp., and has apparently taught numerous classes with this as a textbook. The fact that it has now appeared in a second edition is evidence of its value and usefulness.

The chapter headings run as follows: Definitions, Testing Aircraft Materials, Steel and Its Alloys, Aircraft Steels, Heat Treatment of Steel, Surface Hardening, Shaping of Steel, Corrosion-Resisting Steels, Nickel Alloys, Copper and Its Alloys, Wrought Aluminum Alloys, Aluminum Alloy Coatings, Magnesium Alloys, Welding-Brazing-Soldering, Corrosion and Its Prevention, Wood and Glue, Fabrics and Dope, Plastics, Transparent Materials, and Selection of Materials.

In the main, the book is a textbook of metallurgy connected with aircraft construction, and a very excellent one. A surprising amount of information has been packed into this one book. It is also valuable for reference, since a very complete index is included. For example, the reviewer recently had occasion to look up the composition of Inconel and did not find it in several handbooks, but here it is readily located from the index and satisfactorily detailed information is given. The S.A.E. numbering system for steels is described and used throughout the book, but only with reference to steels used in aircraft. Army and Navy specification numbers are also given, but here again only with reference to aircraft materials.

The sections on non-metallic materials are relatively less detailed and of lesser value to one seeking definite information. It is simply impossible to cover as much ground as this book does, and treat all materials in satisfactory detail. Plastics are covered in a chapter of only seven pages, which seems relatively inadequate for more than a very superficial consideration, although they are also treated in connection with "dopes" and transparent materials. The chapter on corrosion prevention is 29 pages long and well done. Numerous plating and finishing treatments are described here and also elsewhere in the book. The main emphasis is placed on a detailed description of cadmium plating, and other plating processes are more briefly described in relation to this.

The book is well illustrated with 54 figures and photographs, and there are also 24 tables of data of various kinds. It is a very convenient and useful book, and one which could well be more widely owned, in view of the low price.

THE FUNDAMENTALS OF ELECTROCHEMISTRY AND ELECTRODEPOSITION

By SAMUEL GLASSTONE

Published by The American Electroplaters' Society

545 Fifth Avenue, New York City, 1943. Price $2.00

A.E.S. BOOK DEPARTMENT

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MEMBERSHIP REPORT

CLARENCE C. HELMLE

Chairman, Membership Committee

To August, 1943

ELECTIONS

Buffalo Branch

EDWIN W. ERICKSON, c/o Pierce & Stevens, Inc., 710 Ohio St., Buffalo, N. Y., Associate.

D. E. ELLIS, c/o Pierce & Stevens, Inc., 710 Ohio St., Buffalo, N. Y., Associate.

DAVID KILMURRAY, 190 Bird Ave., Buffalo, 13, New York, Active.

DOUGLAS L. FOSTER, 186 W. Chippewa St., Buffalo, N. Y., Associate.

DONALD S. HEPBURN, c/o Bell Aircraft Corporation, 2495 Main St., Buffalo, N. Y., Active.

JOHN N. WOOD, 216 Crosman Terr., Rochester, N. Y., Associate.

WILLIAM J. WALSH, 140 Parkdale Ave., Buffalo, N. Y., Active.

J. LAWRENCE OSBORNE, 1095 Niagara Street, Buffalo, N. Y., Active.

Chicago Branch

JOHN J. CHABALA, c/o Appleton Electric Co., 1701 Wellington St., Chicago, Ill., Active.

C. F. BELM, JR., 4705 Palmer St., Chicago, Ill., Active.

ROY POPULORUM, 3745 Diversey Ave., Chicago, Ill., Associate.

THOMAS MORAN, 4360 Shields Ave., Chicago, Ill., Active.

PAUL WOODSON, 1308 N. La Salle St., Chicago, Ill., Associate.

Cleveland Branch

STANLEY J. ATMA, 2950 Mayfield Rd., Cleveland Heights, Ohio, Associate.

FREDERICK G. BARKER, JR., 2950 Mayfield Rd., Cleveland Heights, Ohio, Associate.

CLARENCE E. MEYER, 28275 Detroit Rd., Westlake, Ohio, Active.

JOSEPH SALETEL, 1572 Addison Rd., Cleveland, Ohio, Active.

Dayton Branch

RALPH EMERSON COLLINS, 819 W. Columbia, Springfield, Ohio, Active.

Springfield Branch

WILLIAM ANCRUM, 83 Warrenton St., Springfield, Mass., Active.

Philadelphia Branch

ALLEN HISAYOSHI OKAMOTO, 1001 14th Ave., Bethlehem, Pa., Active.

APPLICATIONS

Chicago Branch

R. W. TIMBERLAKE, Box 575, Kansas City, Mo., Associate.

W. E. BRUSE, c/o Bendix Aviation Corp., South Bend, Ind., Associate.

W. S. MORRISON, c/o Illinois Water Treatment Co., Rockford, Ill., Associate.

W. L. DONOVAN, 7512 N. Claremont Ave., Chicago, Ill., Associate.

Cleveland Branch

RUEL K. SHIMWAY, c/o A. & R. Hard Chrome Co., 12309 St. Clair Ave., Cleveland, Ohio, Active.

CLIFF L. RICKETTS, c/o Talon, Inc., Arch Street, Meadville, Pa., Associate.

Dayton Branch

VICTOR LAVERN SURRELL, 3114 N. Dixie Dr., Dayton, Ohio, Active.

Newark Branch

CLIFFORD STRUYK, 1001 E. 25th St., Paterson, N. J., Associate.

Philadelphia Branch

HARRY BROWN, Active. BENJAMIN MINKIN, Active.

DON P. VOLINO, Associate.

Waterbury Branch

JACK BAIN, 545 Fifth Ave., New York, N. Y., Associate.

DONALD ISAACS, c/o Chrome Hardening Co., 183 Regent St., Redfern, Sydney, Australia, Active.

SUSPENSIONS

Boston Branch

FLOYD S. RAY, 20 Main St., E. Haverhill, Mass., Active.

ROBERT K. JACKSON, 28 Marion Rd., Belmont, Mass., Associate.

HAROLD M. BRIGHAM, 6 Orris St., Auburndale, Mass., Active.

Chicago Branch

E. W. GORRINGE, 2196 S. 10th East, Salt Lake City, Utah, Active.

H. P. METZGER, 4117 N. Francisco Ave., Chicago, Ill., Active.

J. CERCEO, 814 S. Kilbourn, Chicago, Ill., Active.

Toronto Branch

JOHN CONDIN
J. A. T. MARTIN
B. J. STOCKLEY
G. SMITH

Newark Branch

PETER CATANIA, Associate.
CARL D. CHAMBERS, Active.
HYMAN LIBOVITZ, Active.
G. E. McGUIRE, Associate.
LAURIE SALERNO, Active.

RESIGNATIONS

BENEDICT W. BERTINI, 50 Hillcrest Ave., Lexington, Mass., Active, Boston Branch.

J. READETTE, 312 Soper Ave., Rockford, Ill., Active, Chicago Branch.

SEYMOUR KAPLAN, Baltimore-Washington Branch.

Waterbury Branch

CHARLES F. HEALEY, 169 Buckingham St., Waterbury, Conn., Associate.

CLYDE D. MICHAELS, Fairfield Tin Mill, Fairfield, Ala., Associate.

TRANSFERS

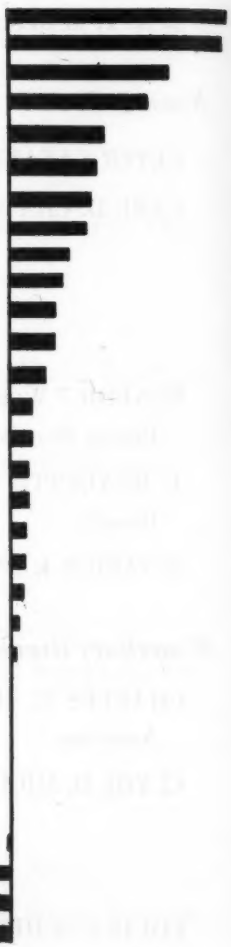
LOUIS J. SCHUSTIK, c/o E. I. du Pont de Nemours & Co., Inc., 230 East Ohio St., Chicago, Ill., Associate. Transferred to Milwaukee Branch from Buffalo Branch.

DEATHS

VERNON J. TWYNING, Grand Rapids Branch.

MEMBERSHIP CHART

BRANCH	May 1942	Change in Membership	Percent Change
ST. LOUIS	83	+20	+24.1
BUFFALO	60	+14	+23.3
CINCINNATI	49	+ 8½	+17
INDIANAPOLIS	57	+ 8½	+14.9
GRAND RAPIDS	94	+ 9½	+10.1
SPRINGFIELD	70	+ 6½	+ 9.2
CLEVELAND	103	+ 9	+ 8.7
SAN FRANCISCO	50	+ 4	+ 8
NEWARK	174	+11	+ 6.3
TOLEDO	36	+ 2	+ 5.5
BALT.-WASHINGTON	103	+ 5	+ 4.9
HARTFORD	73	+ 3½	+ 4.7
NEW YORK	137	+ 5	+ 3.6
PHILADELPHIA	135	+ 3	+ 2.2
TORONTO	94	+ 2	+ 2.1
CHICAGO	278	+ 5½	+ 1.9
NEW HAVEN	103	+ 2	+ 1.9
MILWAUKEE	94	+ 1½	+ 1.5
WATERBURY	106	+ 1½	+ 1.4
BRIDGEPORT	78	+ 1	+ 1.2
BOSTON	119	+ 1	+ .84
LOS ANGELES	127	+ ½	+ .39
MONTREAL	50	...	...
PITTSBURGH	56	...	...
PROV.-ATTLEBORO	49	...	...
ROCHESTER	86	...	...
SYRACUSE	49	...	...
DETROIT	282	− ½	− .17
LANCASTER	40	− 2	− 5
ANDERSON	32	− 2½	− 7.8
DAYTON	98	− 8	− 8.1



MEMBERSHIP May 1st, 1943 = 2965
MEMBERSHIP Aug. 1, 1943 = 3073
GAIN IN MEMBERSHIP = 108
Percent of Gain 3.6%

BUYERS' GUIDE

ABRASIVES

Baker Co., M. E., Cambridge, Mass.
Buckingham Products Co., The, Detroit, Mich.
Burns, E. Reed Mfg. Corp., Brooklyn, N. Y.
Divine Brothers Co., Utica, N. Y.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Harrison & Co., Inc., Haverhill, Mass.
Kocour, Chicago, Ill.
Lasalco, Inc., St. Louis, Mo.
L'Hommedieu & Sons Co., Chas. F., Chicago, Ill.
Stutz Mfg. Co., Geo. A., Chicago, Ill.
Udylite Corp., The, Detroit, Mich.

ACTIVATED CARBONS

Baker Co., M. E., Cambridge, Mass.
Darco Corporation, New York 17, N. Y.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Harshaw Chemical Co., The, Cleveland, Ohio
Industrial Filter & Pump Mfg. Co., Chicago, Ill.
Lasalco, Inc., St. Louis, Mo.
L'Hommedieu & Sons Co., Chicago, Ill.
MacDermid, Inc., Waterbury, Conn.
McGean Chemical Co., Cleveland, Ohio
Stutz Mfg. Co., Geo. A., Chicago, Ill.
Udylite Corp., The, Detroit, Mich.

ALKALIES

Harshaw Chemical Co., The, Cleveland, Ohio

ANODES—BRASS

American Brass Co., The, Waterbury, Conn.
Harshaw Chemical Co., The, Cleveland, Ohio

ANODES—CADMIUM

Baker Co., M. E., Cambridge, Mass.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Harshaw Chemical Co., The, Cleveland, Ohio
Lasalco, Inc., St. Louis, Mo.
L'Hommedieu & Sons Co., Chas. F., Chicago, Ill.
MacDermid, Inc., Waterbury, Conn.
McGean Chemical Co., Cleveland, Ohio
Stutz Mfg. Co., Geo. A., Chicago, Ill.
Udylite Corp., The, Detroit, Mich.

ANODES—COPPER

American Brass Company, The, Waterbury, Conn.
Baker Co., M. E., Cambridge, Mass.
Hanson-Vin Winkle-Munning Co., Matawan, N. J.
Harshaw Chemical Co., The, Cleveland, Ohio
Lasalco, Inc., St. Louis, Mo.
L'Hommedieu & Sons Co., Chas. F., Chicago, Ill.
MacDermid, Inc., Waterbury, Conn.
McGean Chemical Co., Cleveland, Ohio
Seymour Mfg. Co., The, Seymour, Conn.
Stutz Mfg. Co., Geo. A., Chicago, Ill.
Udylite Corp., The, Detroit, Mich.

ANODES—GOLD

Baker & Co., Inc., Newark, N. J.
Baker Co., M. E., Cambridge, Mass.
Lasalco, Inc., St. Louis, Mo.
L'Hommedieu & Sons Co., Chas. F., Chicago, Ill.
Stutz Mfg. Co., Geo. A., Chicago, Ill.

ANODES—LEAD

Baker Co., M. E., Cambridge, Mass.
Enthone Co., New Haven, Conn.
Hanson-Van Winkle-Munning Co., Matawan, N. J.

BUYERS' GUIDE

ANODES—LEAD

Harshaw Chemical Co., The, Cleveland, Ohio
Heil Engineering Co., Cleveland, Ohio
Lasalco, Inc., St. Louis, Mo.
L'Hommedieu & Sons Co., Chas. F., Chicago, Ill.
MacDermid, Inc., Waterbury, Conn.
McGean Chemical Co., Cleveland, Ohio
Puritan Mfg. Co., The, Waterbury, Conn.
Storts Welding Co., Meriden, Conn.
Stutz Mfg. Co., Geo. A., Chicago, Ill.
Udylite Corp., The, Detroit, Mich.
U. S. Stoneware Co., The, Akron, Ohio

ANODES—NICKEL

Baker Co., M. E., Cambridge, Mass.
Hanson-Van Winkle-Munning Co., Matawin, N. J.
Harshaw Chemical Co., The, Cleveland, Ohio
Lasalco, Inc., St. Louis, Mo.
L'Hommedieu & Sons Co., Chicago, Ill.
MacDermid, Inc., Waterbury, Conn.
McGean Chemical Co., Cleveland, Ohio
Puritan Mfg. Co., The, Waterbury, Conn.
Seymour Mfg. Co., The, Seymour, Conn.
Stutz Mfg. Co., Geo. A., Chicago, Ill.
Udylite Corp., The, Detroit, Mich.

ANODES—RHODIUM

Baker & Co., Inc., Newark, N. J.
Baker Co., M. E., Cambridge, Mass.
L'Hommedieu & Sons Co., Chas. F., Chicago, Ill.
Stutz Mfg. Co., Geo. A., Chicago, Ill.

ANODES—TIN

Harshaw Chemical Co., The, Cleveland, Ohio

ANODES—ZINC

Baker Co., M. E., Cambridge, Wass.
Hanson-Vin Winkle-Munning Co., Matawan, N. J.
Harshaw Chemical Co., The, Cleveland, Ohio
Lasalco, Inc., St. Louis, Mo.
L'Hommedieu & Sons Co., Chas. F., Chicago, Ill.
MacDermid, Inc., Waterbury, Conn.
Meaker Co., The, Chicago, Ill.
McGean Chemical Co., Cleveland, Ohio

ANODES—ZINC

Seymour Mfg. Co., The, Seymour, Conn.
Stutz Mfg. Co., Geo. A., Chicago, Ill.
Udylite Corp., The, Detroit, Mich.

BARRELS—BURNISHING

Abbott Ball Co., The, Hartford, Conn.
Baker Co., M. E., Cambridge, Mass.
Globe Machine & Stamping Co., Cleveland, Ohio
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Lasalco, Inc., St. Louis, Mo.
L'Hommedieu & Sons Co., Chas. F., Chicago, Ill.
MacDermid, Inc., Waterbury, Conn.
Puritan Mfg. Co., The, Waterbury, Conn.
Stevens, Frederic B., Inc., Detroit, Mich.
Sturgis Products Co., Sturgis, Mich.
Stutz Mfg. Co., Geo. A., Chicago, Ill.
Udylite Corp., The, Detroit, Mich.

BARRELS—PLATING

Baker Co., M. E., Cambridge, Mass.
Hanson-Vin Winkle-Munning Co., Matawan, N. J.
Lasalco, Inc., St. Louis, Mo.
L'Hommedieu & Sons Co., Chas., F., Chicago, Ill.
MacDermid, Inc., Waterbury, Conn.
Meaker Co., The, Chicago, Ill.
Puritan Mfg. Co., The, Waterbury, Conn.
Stevens, Frederic B., Inc., Detroit, Mich.
Stutz Mfg. Co., Geo. A., Chicago, Ill.
Udylite Corp., The, Detroit, Mich.

BARRELS—TUMBLING

Baker Co., M. E., Cambridge, Mass.

BLACK OXIDE PROCESSES

Baker Co., M. E., Cambridge, Mass.
Empire Solvents Corp., New York, N. Y.
Enthone Co., New Haven, Conn.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Lasalco, Inc., St. Louis, Mo.
MacDermid, Inc., Waterbury, Conn.
Mitchell-Bradford Chemical Co., Bridgeport, Conn.
Puritan Mfg. Co., The, Waterbury, Conn.
Stutz Mfg. Co., Geo. A., Chicago, Ill.
Sulphur Products Co., Greensburg, Pa.

BUYERS' GUIDE

BUFFING COMPOUNDS

Baker Co., M. E., Cambridge, Mass.
Buckingham Products Co., The, Detroit, Mich.
Burns Mfg. Corp., E. Reed, Brooklyn, New York
Divine Brothers Co., Utica, N. Y.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Harrison & Co., Inc., Haverhill, Mass.
Kocour Co., Chicago, Ill.
Lasalco, Inc., St. Louis, Mo.
Lea Mfg. Co., The, Waterbury, Conn.
L'Hommedieu & Sons Co., Chas. C., Chicago, Ill.
MacDermid, Inc., Waterbury, Conn.
Puritan Mfg. Co., The, Waterbury, Conn.
Stevens, Frederic B., Detroit, Mich.
Stutz Mfg. Co., Geo. A., Chicago, Ill.
Udylite Corporation, The, Detroit, Mich.

BUFFING MACHINES—AUTOMATIC

Acme Mfg. Co., Detroit, Mich.
Baker Co., M. E., Cambridge, Mass.

BUFFS

Advance Polishing Wheels, Inc., Chicago, Ill.
Baker Co., M. E., Cambridge, Mass.
Buckingham Products Co., The, Detroit, Mich.
Burns Mfg. Corp., E. Reed, Brooklyn, New York
Divine Brothers Company, Utica, N. Y.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Kocour Co., Chicago, Ill.
Lasalco, Inc., St. Louis, Mo.
L'Hommedieu & Sons Co., Chas. F., Chicago, Ill.
MacDermid, Inc., Waterbury, Conn.
Puritan Mfg. Co., The, Waterbury, Conn.
Stevens, Frederic B., Inc., Detroit, Mich.
Stutz Mfg. Co., Geo. A., Chicago, Ill.
Udylite Corp., The, Detroit, Mich.

BURNISHING BALLS

Abbott Ball Co., The, Hartford, Conn.
Baker Co., M. E., Cambridge, Mass.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Lasalco, Inc., St. Louis, Mo.
L'Hommedieu & Sons Co., Chas. F., Chicago, Ill.
MacDermid, Inc., Waterbury, Conn.
Hanson-Van Winkle-Munning Co., Mata-
Stevens, Frederic B., Inc., Detroit, Mich.
Stutz Mfg. Co., Geo. A., Chicago, Ill.

BURNISHING COMPOUNDS

Baker Co., M. E., Cambridge, Mass.
Gumm Chemical Co., Frederick, Kearny, N. J.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Lasalco, Inc., St. Louis, Mo.
L'Hommedieu & Sons Co., Chas. F., Chicago, Ill.
MacDermid, Inc., Waterbury, Conn.
Magnus Chemical Co., Inc., Garwood, N. J.
Magnusson Products Corp., Brooklyn, N. Y.
Oakite Products, Inc., New York, N. Y.
Puritan Mfg. Co., The, Waterbury, Conn.
Stevens, Frederic B., Inc., Detroit, Mich.
Sturgis Products Co., Sturgis, Mich.
Stutz Mfg. Co., Geo. A., Chicago, Ill.
Wyandotte Chemicals Corp., Wyandotte, Mich.

BURRING COMPOUNDS

Baker Co., M. E., Cambridge, Mass.
Buckingham Products Co., The, Detroit, Mich.
Burns Mfg. Corp., E. Reed, Brooklyn, N. Y.
Divine Brothers Company, Utica, N. Y.
Gumm Chemical Co., Frederick, Kearny, N. J.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Harrison & Co., Inc., Haverhill, Mass.
Lasalco, Inc., St. Louis, Mo.
Lea Mfg. Co., The, Waterbury, Conn.
L'Hommedieu & Sons Co., Chas. F., Chicago, Ill.
MacDermid, Inc., Waterbury, Conn.
Puritan Mfg. Co., The, Waterbury, Conn.
Stevens, Frederic B., Inc., Detroit, Mich.
Stutz Mfg. Co., Geo. A., Chicago, Ill.

BURRING MACHINES

Acme Mfg. Co., Detroit, Mich.
Baker Co., M. E., Cambridge, Mass.

CADMIUM SERVICE

Baker Co., M. E., Cambridge, Mass.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Harshaw Chemical Co., The, Cleveland, Ohio
Kocour Co., Chicago, Ill.
MacDermid, Inc., Waterbury, Conn.
McGean Chemical Co., Cleveland, Ohio
Stutz Mfg. Co., Geo. A., Chicago, Ill.
Udylite Corp., The, Detroit, Mich.

BUYERS' GUIDE

CEMENT—POLISHING WHEEL

Baker Co., M. E., Cambridge, Mass.
Buckingham Products Co., Detroit, Mich.
Divine Brothers Company, Utica, N. Y.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Harrison & Co., Inc., Haverhill, Mass.
Lasalco, Inc., St. Louis, Mo.
L'Hommedieu & Sons Co., Chas. F., Chicago, Ill.
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.
Stutz Mfg. Co., Geo. A., Chicago, Ill.
Udylite Corp., The, Detroit, Mich.

CHROMIUM SERVICE

Harshaw Chemical Co., The, Cleveland, Ohio
Kocour Co., Chicago, Ill.
Stutz Mfg. Co., Geo. A., Chicago, Ill.
Udylite Corp., The, Detroit, Mich.

CLEANERS—METAL—ALKALI

Baker Co., M. E., Cambridge, Mass.
Blakeslee & Co., G. S., Chicago, Ill.
Detroit Rex Products Co., Detroit, Mich.
Enthone Co., New Haven, Conn.
Gumm Chemical Co., Frederick, Kearny, N. J.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Harshaw Chemical Co., The, Cleveland, Ohio
Kocour Co., Chicago, Ill.
Lasalco, Inc., St. Louis, Mo.
L'Hommedieu & Sons Co., Chas. F., Chicago, Ill.
MacDermid, Inc., Waterbury, Conn.
Meaker Co., The, Chicago, Ill.
Magnus Chemical Co., Inc., Garwood, N. J.
Magnuson Products Corp., Brooklyn, N. Y.
Mitchell-Bradford Chemical Co., Bridgeport, Conn.
Oakite Products, Inc., New York, N. Y.
Puritan Mfg. Co., The, Waterbury, Conn.
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.
Phillips Mfg. Co., Chicago, Ill.
Stutz Mfg. Co., Geo. A., Chicago, Ill.
Sulphur Products Co., Greensburg, Pa.
Udylite Corp., The, Detroit, Mich.
Wyandotte Chemicals Corp., Wyandotte, Mich.

CLEANERS—METAL—EMULSION

Baker Co., M. E., Cambridge, Mass.
Detroit Rex Products Co., Detroit, Mich.
Enthone Co., New Haven, Conn.
Gumm Chemical Co., Frederick, Kearny, N. J.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Lasalco, Inc., St. Louis, Mo.
MacDermid, Inc., Waterbury, Conn.
Magnus Chemical Co., Inc., Garwood, N. J.
Magnuson Products Corp., Brooklyn, N. Y.
Oakite Products, Inc., New York, N. Y.
Puritan Mfg. Co., The, Waterbury, Conn.
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.
Phillips Mfg. Co., Chicago, Ill.
Stutz Mfg. Co., Geo. A., Chicago, Ill.
Wyandotte Chemicals Corp., Wyandotte, Mich.

CLEANERS—METAL—SOLVENT

A.B.C. Chemical Co., Waterbury, Conn.
Baker Co., M. E., Cambridge, Mass.
Detroit Rex Products Co., Detroit, Mich.
Gumm Chemical Co., Frederick, Kearny, N. J.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Lasalco, Inc., St. Louis, Mo.
L'Hommedieu & Sons Co., Chas. F., Chicago, Ill.
Maas & Waldstein Co., Newark, N. J.
MacDermid, Inc., Waterbury, Conn.
Magnus Chemical Co., Inc., Garwood, N. J.
Magnuson Products Corp., Brooklyn, N. Y.
Mechanical Process Co., South Orange, N. J.
Mitchell-Bradford Chemical Co., Bridgeport, Conn.
Oakite Products, Inc., New York, N. Y.
Puritan Mfg. Co., The, Waterbury, Conn.
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.
Phillips Mfg. Co., Chicago, Ill.
Stutz Mfg. Co., Geo. A., Chicago, Ill.
Udylite Corp., The, Detroit, Mich.
Wyandotte Chemicals Corp., Wyandotte, Mich.
Zapon Division, Atlas Powder Co., Stamford, Conn.

BUYERS' GUIDE

DEBURRING MACHINES

Sturgis Products Co., The, Sturgis, Mich.
Lea Mfg. Co., The, Waterbury, Conn.

DEGREASING EQUIPMENT—SOLVENT

A.B.C. Chemical Co., Waterbury, Conn.
Baker Co., M. E., Cambridge, Mass.
Blakeslee & Co., G. S., Chicago, Ill.
Detroit Rex Products Co., Detroit, Mich.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Lasalco, Inc., St. Louis, Mo.
L'Hommedieu & Sons Co., Chas. F., Chicago, Ill.
MacDermid, Inc., Waterbury, Conn.
Magnus Chemical Co., Inc., Garwood, N. J.
Mechanical Process Co., South Orange, N. J.
Phillips Mfg. Co., Chicago, Ill.
Stevens, Frederic B., Inc., Detroit, Mich.
Stutz Mfg. Co., Geo. A., Chicago, Ill.
Udylite Corporation, The, Detroit, Mich.

DRYERS

Blakeslee & Co., G. S., Chicago, Ill.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Lasalco, Inc., St. Louis, Mo.
L'Hommedieu & Sons Co., Chas. F., Chicago, Ill.
Magnus Chemical Co., Inc., Garwood, N. J.
Meaker Co., The, Chicago, Ill.
Stutz Mfg. Co., Geo. A., Chicago, Ill.

DRYERS—CENTRIFUGAL

Baker Co., M. E., Cambridge, Mass.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Lasalco, Inc., St. Louis, Mo.
L'Hommedieu & Sons Co., Chas. F., Chicago, Ill.
MacDermid, Inc., Waterbury, Conn.
Meaker Co., The, Chicago, Ill.
Stutz Mfg. Co., Geo. A., Chicago, Ill.
Udylite Corp., The, Detroit, Mich.

EQUIPMENT, PLATING—AUTOMATIC AND SEMI-AUTOMATIC

Baker Co., M. E., Cambridge, Mass.
Ceilcote Co., The, Cleveland, Ohio
Enthone Co., New Haven, Conn.
Gumm Chemical Co., Frederick, Kearny, N. J.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Heil Engineering Co., Cleveland, Ohio
Lasalco, Inc., St. Louis, Mo.
L'Hommedieu & Sons Co., Chas. F., Chicago, Ill.
MacDermid, Inc., Waterbury, Conn.
Meaker Co., The, Chicago, Ill.
Stevens, Frederic B., Inc., Detroit, Mich.
Stutz Mfg. Co., Geo. A., Chicago, Ill.
Udylite Corp., The, Detroit, Mich.

FILTERS

Alsop Engineering Corp., Milldale, Conn.
Baker Co., M. E., Cambridge, Mass.
Enthone Co., New Haven, Conn.
Gumm Chemical Co., Frederick, Kearny, N. J.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Industrial Filter & Pump Mfg. Co., Chicago, Ill.
Lasalco, Inc., St. Louis, Mo.
L'Hommedieu & Sons Co., Chas. F., Chicago, Ill.
MacDermid, Inc., Waterbury, Conn.
Meaker Co., The, Chicago, Ill.
Stevens, Frederic B., Inc., Detroit, Mich.
Stutz Mfg. Co., Geo. A., Chicago, Ill.
Udylite Corp., The, Detroit, Mich.

GENERATORS

Baker Co., M. E., Cambridge, Mass.
Gumm Chemical Co., Frederick, Kearny, N. J.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Lasalco, Inc., St. Louis, Mo.
L'Hommedieu & Sons Co., Chas. F., Chicago, Ill.
MacDermid, Inc., Waterbury, Conn.
Meaker Co., The, Chicago, Ill.
Stevens, Frederic B., Inc., Detroit, Mich.
Stutz Mfg. Co., Geo. A., Chicago, Ill.
Udylite Corp., The, Detroit, Mich.

BUYERS' GUIDE

GLUE—POLISHING WHEEL

Advance Polishing Wheels, Inc., Chicago, Ill.
Baker Co., M. E., Cambridge, Mass.
Buckingham Products Co., The, Detroit, Mich.
Burns Mfg. Corp., E. Reed, Brooklyn, N. Y.
Divine Brothers Company, Utica, N. Y.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Lasalco, Inc., St. Louis, Mo.
Lea Mfg. Co., The, Waterbury, Conn.
L'Hommedieu & Sons Co., Chas. F., Chicago, Ill.
Stutz Mfg. Co., Geo. A., Chicago, Ill.
Udylite Corp., The, Detroit, Mich.

GRINDERS—BELT

Hammond Machinery Builders, Inc., Kalamazoo, Mich.
Lasalco, Inc., St. Louis, Mo.
Stutz Mfg. Co., Geo. A., Chicago, Ill.

GRINDING MACHINES SPECIAL

Acme Mfg. Co., Detroit, Mich.

GRINDERS PORTABLE

Hammond Machinery Builders, Inc., Kalamazoo, Mich.
Stutz Mfg. Co., Geo. A., Chicago, Ill.

LACQUER

Egyptian Lacquer Mfg. Co., The, New York, N. Y.
Maas & Waldstein Co., Newark, N. J.
Michigan Chrome & Chemical Co., Detroit, Mich.
Udylite Corp., The, Detroit, Mich.
Zapon Division, Atlas Powder Co., Stamford, Conn.

LACQUER—SPRAY EQUIPMENT

Baker Co., M. E., Cambridge, Mass.
Ceilcote Co., The, Cleveland, Ohio
Paasche Airbrush Co., Chicago, Ill.

LATHES—POLISHING AND BUFFERS

Acme Mfg. Co., Detroit, Mich.
Baker Co., M. E., Cambridge, Mass.
Divine Brothers Company, Utica, N. Y.
Hammond Machinery Builders, Inc., Kalamazoo, Mich.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Lasalco, Inc., St. Louis, Mo.
L'Hommedieu & Sons Co., Chas. F., Chicago, Ill.
MacDermid, Inc., Waterbury, Conn.
Puritan Mfg. Co., The, Waterbury, Conn.
Stevens, Frederic B., Inc., Detroit, Mich.
Stutz Mfg. Co., Geo. A., Chicago, Ill.
Udylite Corp., The, Detroit, Mich.

METAL WORKING LUBRICANTS

Magnus Chemical Co., Inc., Garwood, N. J.
Stutz Mfg. Co., Geo. A., Chicago, Ill.

PLATING CHEMICALS

McGean Chemical Co., Cleveland, Ohio
Merck & Co., Rahway, N. J.

POLISHING MACHINES—AUTOMATIC

Acme Mfg. Co., Detroit, Mich.

RACK COATINGS

A.B.C. Chemical Co., Waterbury, Conn.
Baker Co., M. E., Cambridge, Mass.
Ceilcote Co., The, Cleveland, Ohio
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Lasalco, Inc., St. Louis, Mo.
L'Hommedieu & Sons Co., Chas. F., Chicago, Ill.
Maas & Waldstein Co., Newark, N. J.
MacDermid, Inc., Waterbury, Conn.
Michigan Chrome & Chemical Co., Detroit, Mich.
Stevens, Frederic B., Inc., Detroit, Mich.
Stutz Mfg. Co., Geo. A., Chicago, Ill.
Udylite Corp., The, Detroit, Mich.
U. S. Stoneware Co., The, Akron, Ohio
Zapon Division, Atlas Powder Co., Stamford, Conn.

BUYERS' GUIDE

RECTIFIERS

Baker Company, M. E., Cambridge, Mass.
Enthone Co., New Haven, Conn.
General Electric Co., Bridgeport, Conn.
W. Green Electric Co., Inc., New York, N. Y.
Gumm Chemical Co., Frederick, Kearny, N. J.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Lasalco, Inc., St. Louis, Mo.
L'Hommedieu & Sons Co., Chas. F., Chicago, Ill.
MacDermid, Inc., Waterbury, Conn.
Meaker Co., The, Chicago, Ill.
Stevens, Frederic B., Inc., Detroit, Mich.
Stutz Mfg. Co., Geo. A., Chicago, Ill.
Udylite Corporation, The, Detroit, Mich.

RHEOSTATS

Baker Company, M. E., Cambridge, Mass.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Lasalco, Inc., St. Louis, Mo.
L'Hommedieu & Sons Co., Chas. F., Chicago, Ill.
MacDermid, Inc., Waterbury, Conn.
Meaker Co., The, Chicago, Ill.
Stevens, Frederic B., Inc., Detroit, Mich.
Stutz Mfg. Co., Geo. A., Chicago, Ill.
Udylite Corporation, The, Detroit, Mich.

RUST PROOFING SYSTEMS

Detroit Rex Products Co., Detroit, Mich.

SOAP

Abbott Ball Company, The, Hartford, Conn.
Baker Company, M. E., Cambridge, Mass.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Harshaw Chemical Co., The, Cleveland, Ohio.
Lasalco, Inc., St. Louis, Mo.
L'Hommedieu & Sons Co., Chas. F., Chicago, Ill.
MacDermid, Inc., Waterbury, Conn.
Magnus Chemical Co., Inc., Garwood, N. J.
Magnuson Products Corp., Brooklyn, N. Y.
Puritan Mfg. Co., The, Waterbury, Conn.
Stutz Mfg. Co., Geo. A., Chicago, Ill.

SOLUTION CONTROL METHODS

Hanson-Van Winkle-Munning Co., Matawan, N. J.
Kocour Co., Chicago, Ill.
Lasalco, Inc., St. Louis, Mo.
Stutz Mfg. Co., Geo. A., Chicago, Ill.
Udylite Corporation, The, Detroit, Mich.

SOLUTIONS—NICKEL—TIN—LEAD, ETC.

Zialite Corporation, Worcester, Mass.

SOLVENT—RECOVERY SERVICE

A. B. C. Chemical Co., Waterbury, Conn.
Baker Company, M. E., Cambridge, Mass.
Mechanical Process Co., South Orange, N. J.
Phillips Mfg. Co., Chicago, Ill.

STRIPPING SOLUTIONS—LACQUERS

Detroit Rex Products Co., Detroit, Mich.
Enthone Co., New Haven, Conn.
Gumm Chemical Co., Frederick, Kearny, N. J.
Lasalco, Inc., St. Louis, Mo.
L'Hommedieu & Sons Co., Chas. F., Chicago, Ill.
Maas & Waldstein Co., Newark, N. J.
Magnuson Products Corp., Brooklyn N. Y.
Michigan Chrome & Chemical Co., Detroit, Mich.
Oakite Products, Inc., New York, N. Y.
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.
Puritan Mfg. Co., The, Waterbury, Conn.
Stutz Mfg. Co., Geo. A., Chicago, Ill.
Wyandotte Chemicals Corp., Wyandotte, Mich.

STRIPPING SOLUTIONS—METALS

Baker Company, M. E., Cambridge, Mass.
Lasalco, Inc., St. Louis, Mo.
L'Hommedieu & Sons Co., Chas. F., Chicago, Ill.
MacDermid, Inc., Waterbury, Conn.
Magnus Chemical Co., Inc., Garwood, N. J.
Magnuson Products Corp., Brooklyn, N. Y.
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.
Puritan Mfg. Co., The, Waterbury, Conn.
Stutz Mfg. Co., Geo. A., Chicago, Ill.
Sulphur Products Co., Greensburg, Pa.

BUYERS' GUIDE

TANKS—CERAMIC

Baker Company, M. E., Cambridge, Mass.
Ceilcote Company, The, Cleveland, Ohio.
Enthone Co., New Haven, Conn.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Heil Engineering Co., Cleveland, Ohio.
Lasalco, Inc., St. Louis, Mo.
L'Hommedieu & Sons Co., Chas. F., Chicago, Ill.
MacDermid, Inc., Waterbury, Conn.
Storts Welding Co., Meriden, Conn.
Stutz Mfg. Co., Geo. A., Chicago, Ill.
Udylite Corporation, The, Detroit, Mich.
U. S. Stoneware Co., The, Akron, Ohio.

TANKS—GLASS LINED

Alsop Engineering Corp., Milldale, Conn.

TANKS—STEEL, LINED

Baker Company, M. E., Cambridge, Mass.
Ceilcote Company, The, Cleveland, Ohio.
Enthone Co., New Haven, Conn.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Heil Engineering Co., Cleveland, Ohio.
Industrial Filter & Pump Mfg. Co., Chicago, Ill.
Lasalco, Inc., St. Louis, Mo.
L'Hommedieu & Sons Co., Chas. F., Chicago, Ill.
MacDermid, Inc., Waterbury, Conn.
Meaker Co., The, Chicago, Ill.
Mitchell-Bradford Chemical Co., Bridgeport, Conn.
Storts Welding Co., Meriden, Conn.
Stutz Mfg. Co., Geo. A., Chicago, Ill.
Udylite Corporation, The, Detroit, Mich.
U. S. Stoneware Co., The, Akron, Ohio.

TANKS—WOOD

Baker Company, M. E., Cambridge, Mass.
Ceilcote Company, The, Cleveland, Ohio.
Enthone Co., New Haven, Conn.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
Heil Engineering Co., Cleveland, Ohio.
Lasalco, Inc., St. Louis, Mo.
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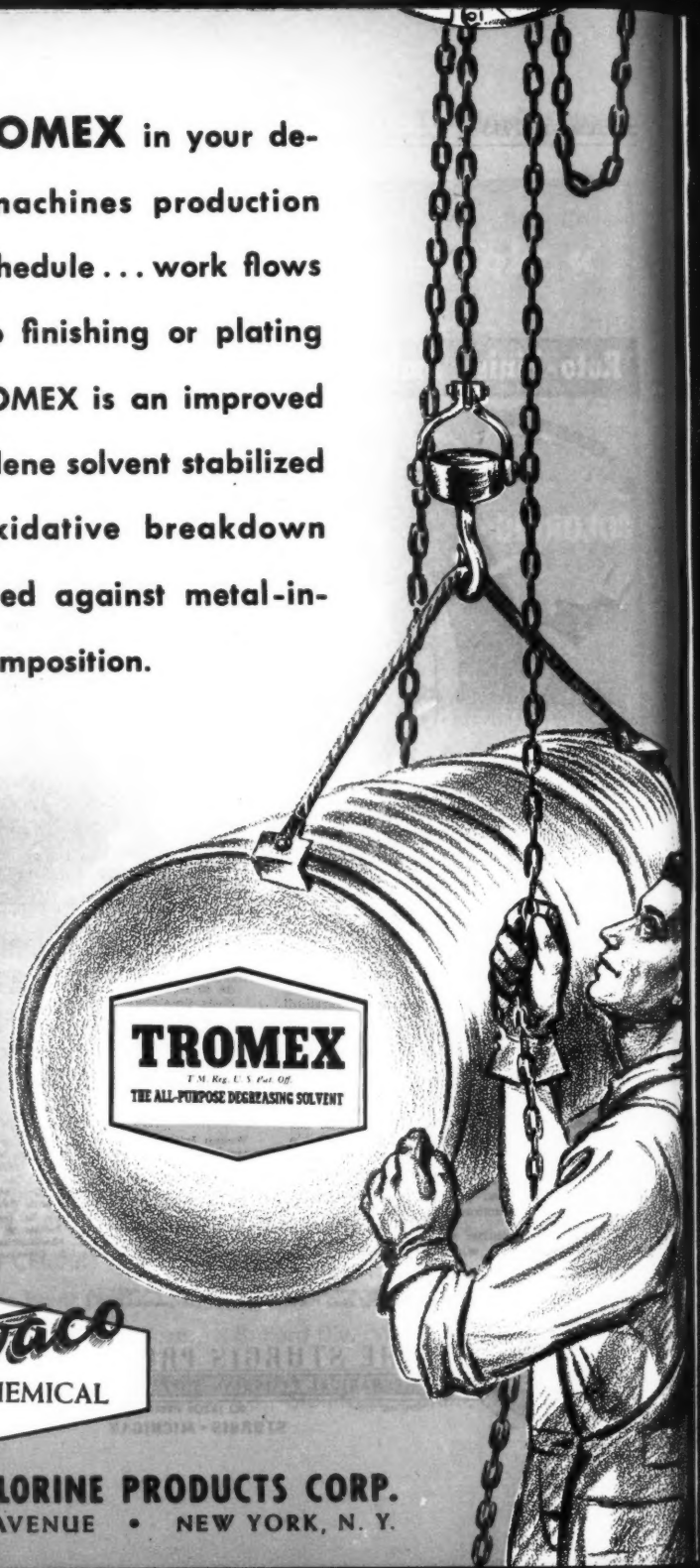

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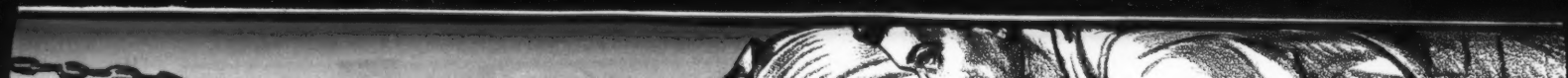

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